IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication NOVEMBER 17, 1960

Special Report

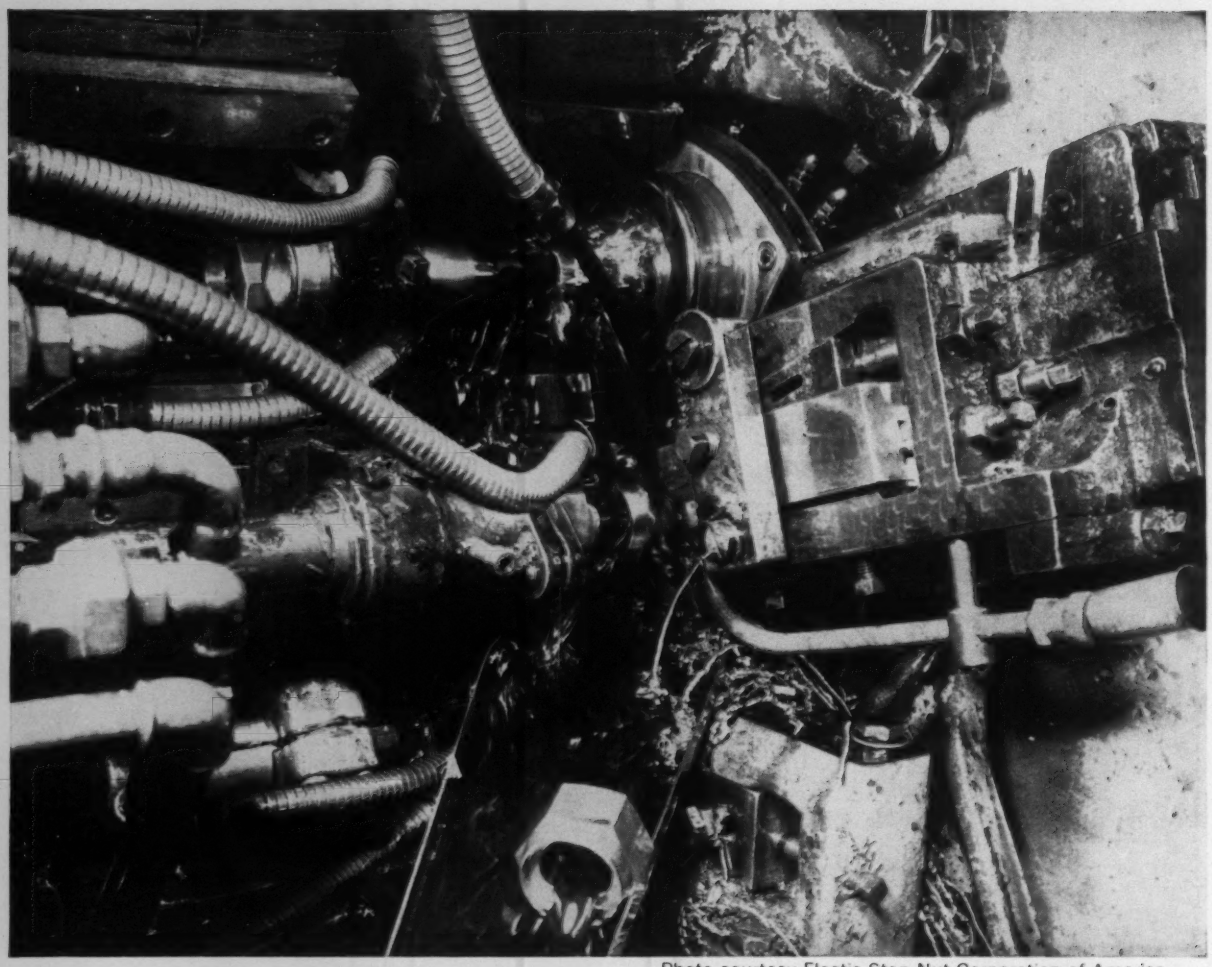
How BUSINESS Reacts To the Democratic Victory

Can the New Administration Hold Back a Recession? —P. 105

Delayed Recovery in Steel: When Will It Start to Move? p. 109

Quenched Arc Cuts Honeycomb p. 141

Digest of the Week p. 2-3



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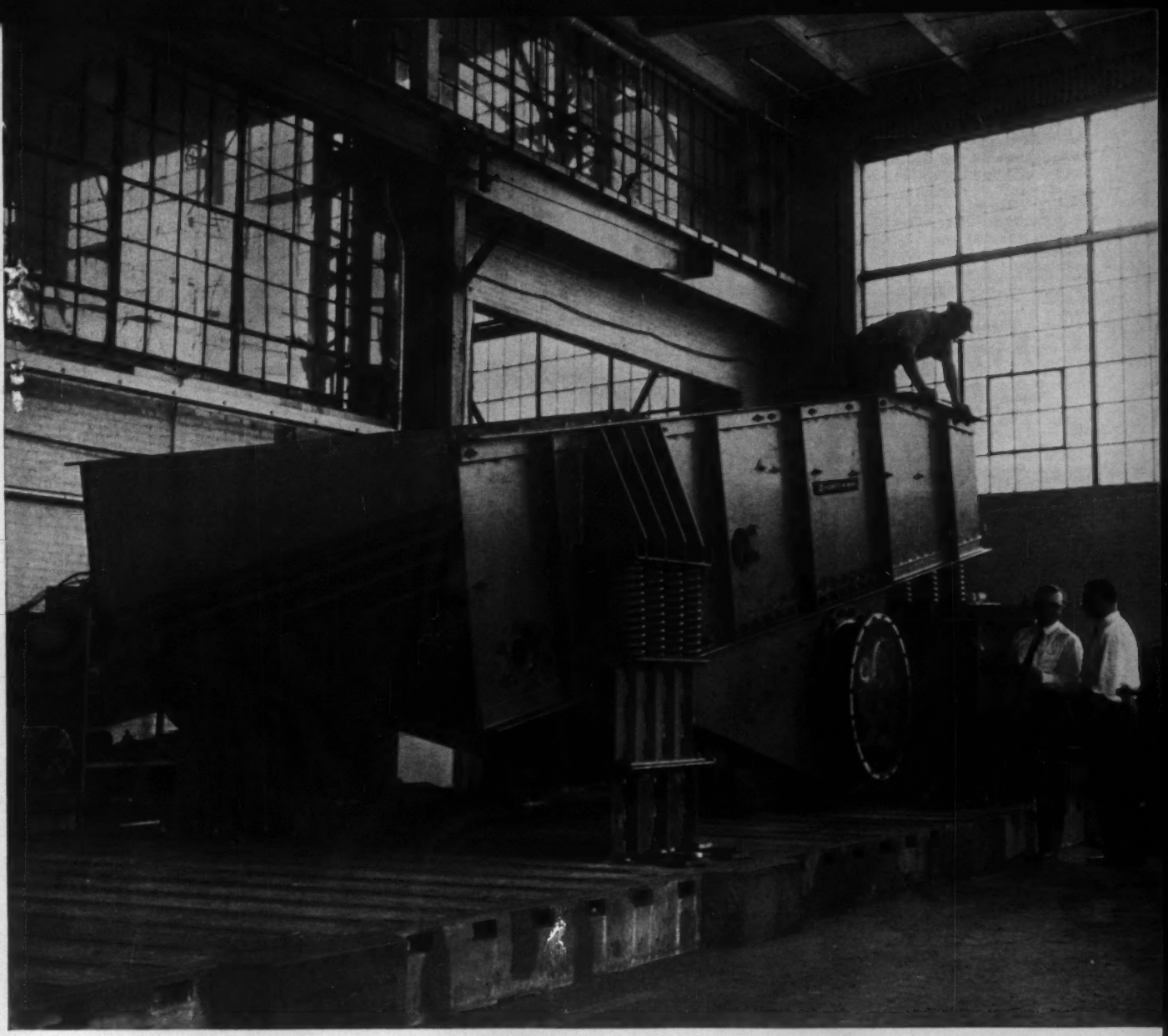

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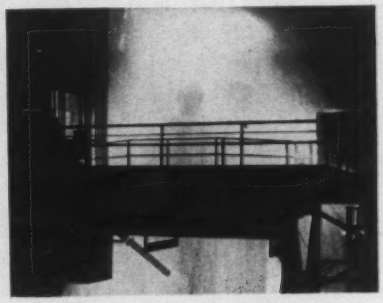
News of the Industry

STEEL RECOVERY

By Mid-1961—It's hard to find any indicators that point to a substantial recovery of steel. But by



next March, the pickup will start to show and be well under way by mid-1961. P. 109

IRON ORE PELLETS

New Canadian Mine—Can-Fer Mines, Ltd., move ahead on an openpit mining and pelletizing operation in Ontario province. Company hopes to put down pellets in a Lake port at very competitive prices. P. 110

REAL ECONOMIC GROWTH

The Record Is Impressive—Arguments about economic growth were an important part of the recent election campaign. But real gains over the post WW II period are impressive, showing long-term advances for the nation. P. 117

WEST COAST

Cautious?—Businessmen on the

Metalworking

Special Report

How BUSINESS Reacts To the Democratic Victory

Can the New Administration Hold Back a Recession? —P. 105

Cover Feature

ELECTION REACTION—This week's Special Report covers the results of the Democratic victory. It tells what to expect in Washington, plus a major staff report based on interviews with leading executives on their interpretation. P. 105

West Coast are cautious in expressing optimism for the future. However, companies there still aim at expansion and the list of new companies grows bigger. P. 121

MACHINE TOOLS

Numerical Controls—Few orders have resulted from all the interest in numerically controlled tools at the tool show. Efforts to adapt standard tools to tape control meet little success. P. 123

Engineering-Production Developments

HONEYCOMB MACHINING

With an Electric Arc—A new machine is now being used in actual production to cut slabs from common sizes of honeycomb logs. This new process, called quenched-arc cutting, banks on an electrified steel band to cut the material. The diverse method is fast and accurate, and it reduces waste. P. 141

ANNEALED NODULAR IRON

New Research Angle—Annealed nodular iron is fairly easy to machine, but is it heat treatable? Research has come up with some useful answers to solve a production problem. Now just the contact surfaces of certain parts are hardened. The rest of the casting retains its required toughness. P. 144

HARD COAT ANODIZING

For Missiles—A stepped-up program of hard coat anodizing relies on an automatically-controlled rectifier. The machine adds a greater degree of control over the entire cycle. Main aims in the cycle give parts hard wear surfaces that resist corrosion and cracking. P. 146

CERAMIC COATINGS

Find New Jobs—Enamels and ceramic coatings are widening their uses in industry. Here's a practical rundown of the available types on the market. New and better coatings will be needed, however, to keep pace with space needs. Industry demands them. P. 148

WELDING AND CUTTING

With One Torch—Heliarc welding torches, once used only to weld, can now handle cutting jobs, too. You can do it by just increasing the current density. It's a bonus that requires no additional capital investment. P. 152

Market and Price Trends

FLUID POWER

Ready to Grow—Manufacturers of hydraulic and pneumatic components fall instead of rise as expected this year. But they are still convinced it's a growth industry. And many have taken marketing steps to capitalize on the industry's potential. P. 112

AUTOMOTIVE

Plan Ahead—Building automobiles calls for a lot of advance planning. Work on production schedules starts several months in advance of actual output. P. 119

STEEL SUMMARY

Inventory Picture—The full effects of inventory cutbacks and reduced transit time have the effect of cutting millions of tons of steel from 1960 production. Meanwhile, the overall market looks no better for the short term. P. 193

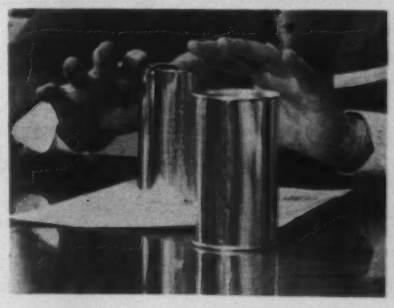
PURCHASING

Teamwork Pays—Lawrence Jarvey, purchasing agent for Oshkosh Motor Co. says close cooperation with management and the shop means a better running purchasing department. He tells The IRON AGE how his system pays off in savings. P. 194

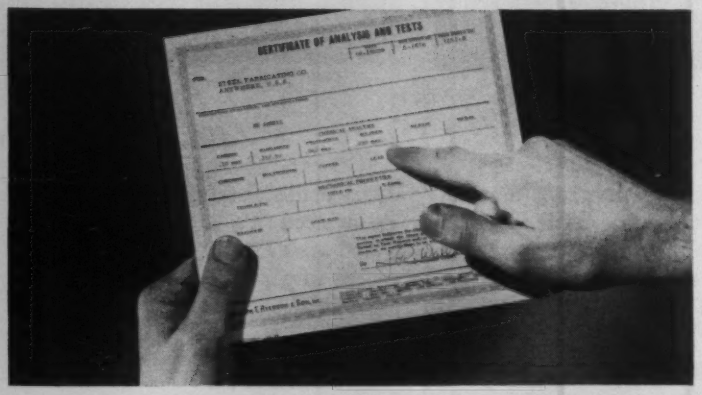
NEXT WEEK

METAL CAN BATTLE

Rough Competition—No field in metalworking is creating tougher competition than the battle for the metal can market. Next week's Special Report covers this no-holds-barred competition. Emphasis is on new developments.



How Ryerson gives you EXTRA VALUE IN SHEET STEEL



Carbon control—Did you know that Ryerson can furnish a conformance report, if requested when your order is placed, certifying that hot or cold rolled low carbon sheets in stock sizes are SAE 1008 with maximum carbon content of .10? This means you can minimize or eliminate problems of variation in formability and weldability.

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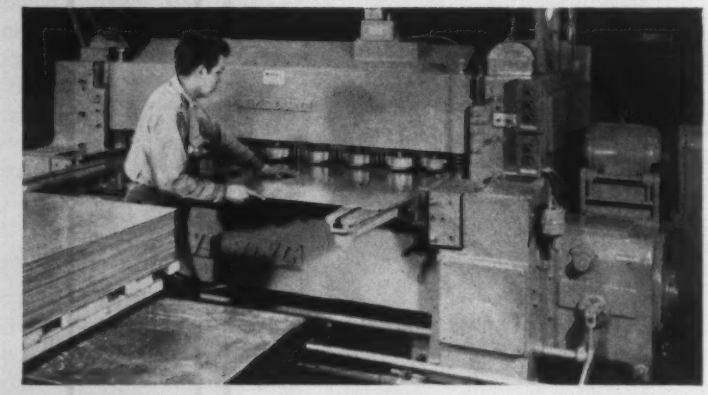

Fast, dependable service—Hundreds of customers often cite these two major reasons for ordering from Ryerson: absolute confidence in "dependability of service as promised," and speed of service to meet their most critical requirements.

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The Significance? The People Are Divided

When the people voted last week, they were evenly divided. This may be encouraging. Perhaps the electorate is no longer a pushover.

All the talk in the world will not bring a "closing-of-the-ranks." President-elect Kennedy must bring the people together.

It would be naive to expect Senator Kennedy to meet all the campaign promises he made. No person could expect delivery on the fast words, the promises, and the confidence expressed as each man went down to the wire.

The people are about evenly split on all major issues of the campaign. They were divided on the candidates. They were split on what each stood for. They differed as to how we should conduct our foreign affairs and our domestic affairs. They differed in their views as to how good or bad our prestige is.

The election gives no great measure of solace to the winner. He just about made the grade. That is a sobering thought. It is not sour grapes from the losing side to say that President-elect Kennedy has a much tougher job than he figured he would have, if elected.

The patriotism and potential leadership of Senator Kennedy are not in question now. What is in doubt—and this was pointed up by the unprecedented close election—is which way the United States is heading in future years.

The cold war is getting hot. The Communists are poised with a new bag of tricks. The economy is faltering. The welfare state is sticking its nose under the tent in various guises. There is a cleavage between older people and younger people which grows more serious. The national debt remains at an astronomical figure—and will grow mightily in a year and a half.

The defenses of our nation must become stronger. A sense of purpose must now be reestablished after a grueling and anxiety-ridden three or four months. It is too light-hearted to say "let's close ranks and let by-gones be by-gones." There never was a bitter, offensive, cutting, and basic hostility between Vice President Nixon and Senator Kennedy. Too much was at stake. Both knew it.

Now President-elect Kennedy has the awful task of uniting one half of the people with the other in a life and death struggle which is shaping up for all of us.

Tom Campbell

Editor-in-Chief

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Photo Courtesy of Budd Co., Red Lion Plant

Operation: Machining a section of a pressure vessel
Material: 4340 carbon steel, approx.: 48" dia.
Speed: 97 rpm
Feed: .020
Depth-of-cut: .080

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Machine: Giddings & Lewis, Double Head (with side rail) Boring Mill
To achieve a 63 finish: Speed: 100 rpm
Feed: .009, **Depth-of-cut:** .020

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Will Election Pep Up Economy?

Will the economy show more pep because of Senator Kennedy's election as president? Best guess: There may be more "urgency" in economic planning. A lot will depend on the way the president-elect carries out his plans—both now and after taking office. It's expected he'll move strongly on anti-recession measures. Action in these areas will come early next year. But their impact on business will be delayed.

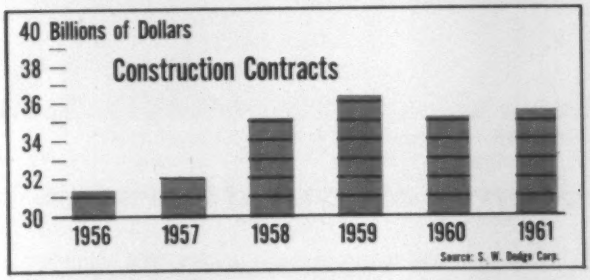
Dodge Predicts Construction Gains

You can look for an increase in construction activity next year, according to analysts for F. W. Dodge Corp.

Dodge economists predict total contracts for building in 1961 will total $35.8 billion, an increase of 1 pct over the expected 1960 total. The gain is expected despite the looked-for dip in general business activity.

Elements of strength in the construction market in '61 should be public building projects, which account for more than one-third of total contracts. Easier money is also expected to help the housing market.

Dodge believes heavy engineering contracts may improve 5 pct over 1960 levels, with highway work setting the pace. Residential building contracts, the biggest construction area, should rise about 1 pct.



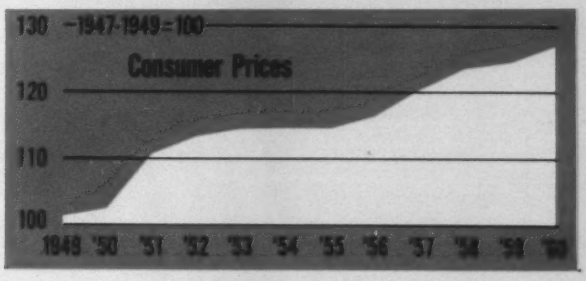
Non-residential building is expected to drop 2 pct, mainly because of a fall-off in business spending for new industrial and commercial building.

Steel Markets May Weaken in '61

Steel sales next year will depend on the trend in the general economy, say forecasters at the University of Pittsburgh annual conference on business prospects. But some of steel's strong markets will probably be less active, according to J. L. Rich, assistant director of commercial research, U. S. Steel Corp. Reviewing these markets he sees: Automotive, down; machinery, down; appliances, down; railroads, down; exports, up.

Price Rises May Be Coming

One election aftermath is concern about price inflation. There's fear that fulfillment of the Democratic platform may bring a new round of inflation. After being reassured for the last few years that price stability was here, consumers and businessmen now are not so



sure. The rise in prices slowed down in the last few years. (See chart). From 1957 to 1960 the increase in the Consumer Price Index was 6.4 (1947-49 = 100). This compares with a gain of 11.7 during the years 1949 to 1952.

Coming: More Funds for Bank Loans

Fresh funds for business loans are being made available at the end of the month thanks to recent credit-easing actions of the Federal Reserve Board. The Board now permits member banks to include vault and till cash as reserves for lending purposes. In the past, banks could only count deposits held in Federal Reserve banks as reserves for lending purposes. Commercial banks can begin making loans based on the fresh revenues as of Nov. 24. The additional lending power will amount to about $2.1 billion.

Business Challenges Reviewed

What are the challenges for business in the next few years? According to Stewart Baeder, an economist for MacKay-Shields Associates, New York, there will be several. Challenges will come in the drive for product improvement, he says, and in the upward spiral of wages. On the wage question, he's optimistic, however. Pointing out wages increased about 8 pct a year in the 1940s, and 5 pct in the 1950s, he sees an average advance of about 3 pct for the 1960s. He also expects productivty gains and wages to go up at the same rate for the decade. And he predicts "brief, but rather severe recessions" in the 1960s.

By 1970, says Mr. Baeder, investment in technology will have increased by more than 130 pct.

Bottom: R. W. Leigh, Vice President—Sales; top, l. to r.: R. H. Ingersoll, Steel Sales Engineer; G. M. Poole, Chief Metallurgist

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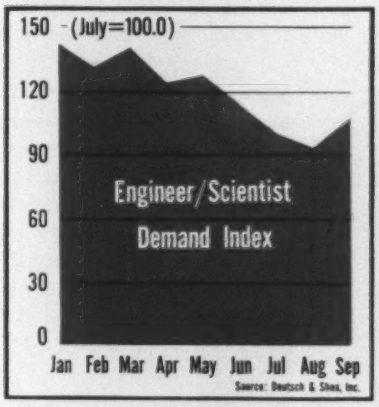
Demand for Engineers Charted by New Index

Demand for engineers and scientists has turned sharply downward since the first of the year, according



to a new formula worked out by Deutsch & Shea, Inc. of New York.

The Engineer/Scientist Demand Index analyzes size and number of recruiting advertisements placed in selected trade publications.

The company also publishes a more comprehensive index, based on recruiting advertisements placed in selected newspapers as well as trade publications. However, this index just goes back as far as July, the base month. Demand as shown by the two indexes varies only slightly.

Unemployment Climbed Sharply in October

As leaked in Washington just before the election, unemployment rose significantly in October. The number of jobless increased by 191,000, climbing to 3,579,000 from 3,388,000, reports the Dept. of Labor.

Seasonally adjusted figures for the ratio of unemployed to the total work force went up to 6.4 pct from 5.7 pct. This is the highest rate since November, 1958. At the same time, the number of workers unemployed for 15 weeks or longer rose to nearly 1 million.

Employment slipped last month from 67,767,000 to 67,490,000. Despite the fact that employment dropped by 277,000 at a time when it normally increases by 300,000, October employment was the highest ever for the month.

URW: Goodyear Seeks Support of Workers

Whether Goodyear Tire & Rubber Co. spends $8-10 million to modernize its big tire-making plant in Akron may be up to the plant's 1450 employees — and their jobs may also hang in the balance.

Through letters and meetings, the company has asked employees to answer whether they are "willing to accept the responsibility of operating the equipment as it would be operated in another location."

Walter H. Rudder, manager of domestic tire production, told workers the Akron factory was the company's highest-cost tire-making facility. He warned operations would have to be moved unless "we get performance equal to the performance we get on similar equipment outside of Akron."

The plant is at a competitive disadvantage, he said, because of its inefficient layout, obsolete equipment, and low man-hour production. However, he said that "all three of these major conditions can be corrected.

Labor Committee Changes?

The election will bring leadership changes to House and Senate Labor Committees in the next session of Congress. However, there will be little change in membership.

The Senate Labor Committee will lose two top-ranking members. Education subcommittee chairman Sen. Murry (D., Mont.) is retiring. Sen. Kennedy, chairman of the Labor subcommittee, moves on to the White House.

Senators McNamara (D., Mich.) and Morse (D., Ore.) are next in line. Sen. McNamara is expected to take the Education subcommittee, leaving Labor open for Sen. Morse.

Rep. Adam Clayton Powell (D., N. Y.) is expected to inherit chairmanship of the House Committee from Rep. Barden (D., N. C.) who did not run for re-election. Rep. Powell has already made plans for changing subcommittee setup, rules, staff.

Subcommittees may have different names and jurisdictions under Rep. Powell's leadership. But Mrs. Edith Green (D., Ore.) will be next in line for a subcommittee chairmanship if there are five subcommittees. Rep. James Roosevelt (D., Calif.) is sixth in line—in case there is an increase.

Two Labor subcommittee Congressmen lost seats: Rep. Wier (D., Minn.); and Rep. Wainwright (R., N. Y.). Three Republican congressmen that labor wanted to defeat, were re-elected: Reps. Ayres (O.), Kearns (Pa.), and Hiestand (Calif.). All three were House conferees on the minimum wage bill in the rump session of Congress.

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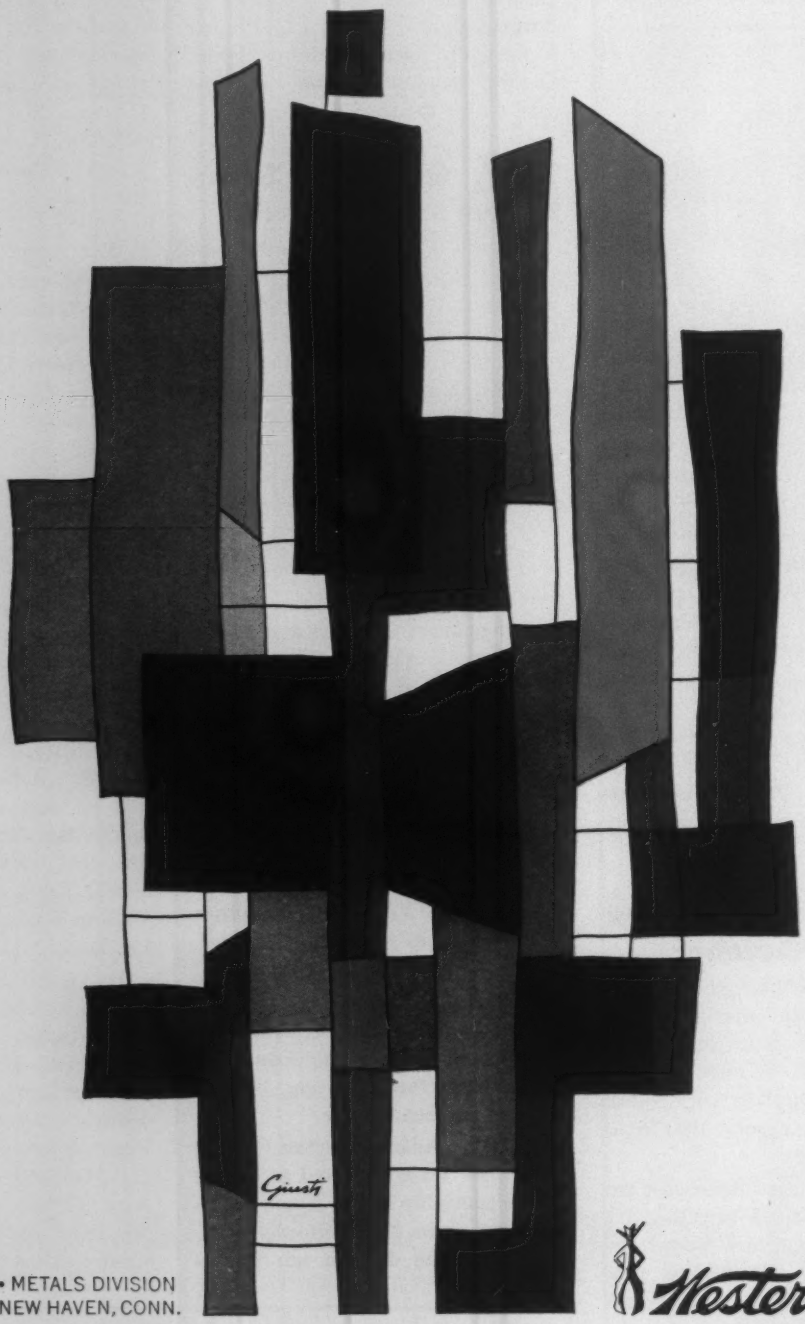

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★AF Hits Management Practices

The Air Force is the first of the three armed services to strike out against management practices in handling defense contracts. The Army and the Navy probably will follow soon.

The services, chafing under persistent Congressional criticism, are trying to cut contract costs and waste before Congress attacks them with more than words. The military men know well that several pieces of legislation on defense procurement policy are scheduled for the 1961 session of Congress.

The Pentagon answer to criticism will be more criticism. And defense contractors will take the brunt of it.

Hard and Soft—The Air Force will approach it in two ways: The "hard" method and the "soft" method. Both are geared to wipe the "waste" label from Air Force spending.

The soft method will be a "management practice survey." The survey will be conducted among major contractors starting shortly with the Martin Co.'s Titan missile program. The announced purpose of the survey is to "determine whether present management methods will continue to keep pace with the rapidly advancing technology of modern weaponry." The basic reason is to cut costs and speed up production.

The "hard" method came in a warning to defense manufacturers from the Air Force. The service warned it may begin denying incentive contracts to those who continue to acquire extra profits on contracts through "overstated prices" rather than by improved management and engineering.

■ Overseas Profits Face Tax Study

The Treasury Department is checking into tax laws covering overseas subsidiaries of American companies.

The tax men are in the midst of checking accumulations of profits in foreign countries. If they find any U. S. taxpayers getting unusual benefits from present laws, the tax men will report to Congress, which asked for the survey.

Whether or not congressmen are pondering legislation to tighten tax laws on overseas profits remains to be seen. However, it seems doubtful. Congress went the other way in legislation last year.

■ Tooling Updated?

Military modernization is setting the stage for a complete updating of machine tool inventories of the Army, Navy and Air Force.

Confidential estimates are that the Air Force, alone, will put $50 million into new production equipment. Much of this will be machine tools.

Surprisingly, the Army, with its MOMAR (MOdern Mobile ARmy) program, and the Navy, tooling up for its submarine push, are playing a bigger part in modernizing inventories.

■ IRS Still Fights 'Unusual' Deductions

The Internal Revenue Service is not content with new regulations to reduce expense account tax deductions by businessmen. The tax men want even tougher rules on deductions for "unusual" expenses such as yachts and lodges.

To back up their case, the revenue officials will do more than scrutinize 1960 tax returns, in which large entertainment expenses must be listed separately. Now they have decided to look at company entertainment deductions of the past few years.

The results of their study of new and past returns will be used to ask Congress to approve stricter regulations in 1961.

■ Census Reports Remain Confidential

The U. S. Supreme Court has backed up a ruling protecting businessmen from being forced to open secret company reports to antitrust investigators.

The decision undoubtedly will be one of the most important to the business world in this session.

It stops the Federal Trade Commission and the Justice Dept. from using businessmen's confidential reports to the U. S. Census Bureau in antitrust proceedings.

The high court refusal to remove the confidential label from the reports keeps the trustbusters from having access to reports on the finances and activities of every interstate corporation in the country.

■ Some Areas May Get RR Rate Cuts

Higher freight rates okayed for the nation's railroads by the Interstate Commerce Commission may work in reverse for some shippers. The rate hike may cause a reduction in some areas.

Some Washington transportation experts say the railroads probably will not boost rates as high as the level approved by ICC. They hint that increased revenues from a general rate increase will permit selective cuts to be made in some areas.

What a heel!

Achilles' mother was sure she had outfitted her fabled fighting son in the best of armor. She had ordered Washington Steel's ColorRold Stainless specifically for this critical purpose. No soldier in the Trojan War had been so carefully prepared for battle. But she made one fatal mistake. In fabricating the suit of armor she ran out of stainless steel and had to substitute a less noble metal for Achilles' right ankle. Paris, getting wind of this substitution, took dead aim at Achilles' heel, and down he went—not more than twenty minutes after this picture was taken.

There is no substitute for stainless steel whether you are building a skyscraper, a space vehicle or a kitchen sink. Washington Steel's ColorRold stainless enables you to enhance the beauty of your quality product. Don't be an Achilles Heel—Never try to substitute for stainless steel.

WASHINGTON STEEL CORPORATION

and ColorRold®

PRODUCERS OF *MicroRold®* STAINLESS SHEET & STRIP

WASHINGTON, PA.

Ford Overseas Spending Climbs to $220 Million

Ford Motor Co. will spend $220 million in foreign operations in 1961. This is a substantial increase over the $138 million spent in 1960.

The money, planned for plant expansion and tooling, proves that "Ford is placing much more emphasis than it has in the past on foreign operations," says Ford Chairman, Henry Ford II.

The spending program closely follows the announcement by General Motors that it would spend $500 million overseas in the next two years. (For the GM spending story see IA, Nov. 10, p. 136)

Mr. Ford refused to say whether the company was planning to introduce a car of the Renault or Volkswagen size for European sale. He said the company does not give out this type information until the product is ready for the market.

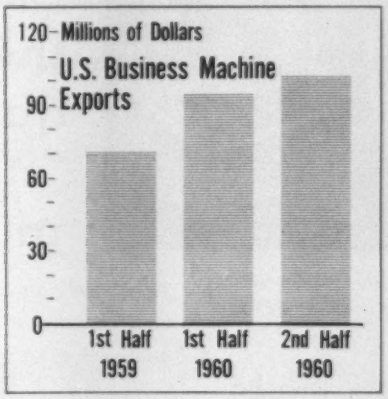
But the new outlay strengthens the belief that Ford is out to capture a greater share of the foreign car market. GM, which has made very solid inroads in that area, now controls 48 pct of passenger car sales in Australia, 20 pct in Germany and 12 pct in Great Britain. It also controls 40 pct of the British truck market.

Business Machine Export Tops 1959 Figures

Exports of U. S. business machines during the first half of 1960 were 34 pct better than in 1959, according to the Business and Defense Services Administration.

Exports for the first six months totaled $94,094,598. This compares with $70,223,674 reported for the first half of 1959. The BDSA says that if the first half trend continues throughout the year, final totals will approach $197 million.

Punch card, electronic computers, and bookkeeping and accounting machines represented 61 pct of the total export value, and 63 pct of the increase over the 1959 period.



The gains in exports of this advanced-type equipment reflect a general upgrading trend of the export market for business machines, says the BDSA.

Foreign Steel Exports May Be Subsidized

Subsidies for exports may explain some of the low prices charged for foreign steel in this country. Use of subsidies is suggested by a survey now being made by a leading American manufacturer.

Preliminary figures show that cold-rolled sheet costs more in Europe than in the U. S. Price of hot-rolled bars delivered here is no more than European mills charge local customers. According to a pricing man, there is every indication that some of the export cost is defrayed by subsidy payments.

Steel Importers Suffer Setback in South

Foreign steel importers suffered a setback last week when the Southern Building Code Congress announced that no more foreign steel will be approved for construction in the 900 cities and towns in the South that have adopted the code.

"The Southern Building Code has specifications with which foreign steel does not comply," said M. L. Clement, SBCC director. "The Congress will enforce the code accordingly."

Kennedy May Improve S. American Relations

Relations between South America and the U. S. will be better—on the surface, at least—with the victory of John F. Kennedy.

Reason: South Americans have always thought the Democrats were more sympathetic to their causes than were the Republicans. Whether this is true or not is beside the point.

The only real sore spot is the fact that the Cuban revolution is being rapidly exported successfully to many South American nations. It doesn't really show yet, but this "exportation" is causing much internal trouble in Venezuela and in some other Latin countries.

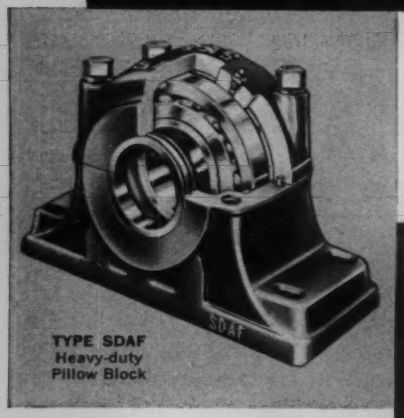
If Senator Kennedy does not live up to the fantastic expectations of the Latins, relations between South America and the U. S. will sag further and fall harder than would ordinarily be the case. It boils down to one basic premise: The South Americans expect far more from the Democrats.

Japanese Step Up Auto Production

As it has in many lines of consumer products, Japan is stepping up its auto production. The latest move is the announcement of a $9.3 million loan to the Isuzu Motor Co., Ltd., of Japan by the Export-Import Bank of Washington for the purchase of U. S. machinery and equipment.

TYPE SAF
Ball or Spherical Roller
Bearing Pillow Block

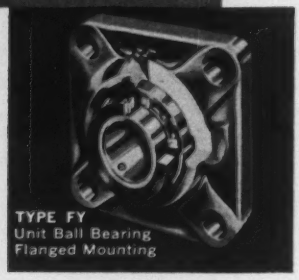
Can you get these "special" qualities in "standard" pillow blocks?



TYPE SDAF
Heavy-duty
Pillow Block

TYPE SY
Unit Ball Bearing
Pillow Block

TYPE SES
Unit Rubber-flex Ball
Bearing Pillow Block



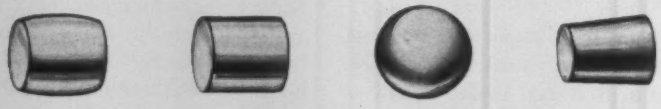
TYPE FY
Unit Ball Bearing
Flanged Mounting

Most pillow blocks offer easy assembly and rugged housings. But can they offer you low friction, self-aligning bearing operation and efficient sealing as well?

They can—if they're the SKF pillow blocks, and flanged mounting, shown here. Type SAF, for example, comes equipped with low-friction ball or spherical roller bearings that are *inherently* self aligning. And these bearings are effectively protected by Triple-Seal rotating rings. Abrasives and corrosives can't get to them—oil or grease can't drip out.

Yet this is a standard SKF pillow block, that is competitively priced in spite of its combination of extra features. We make it for shaft sizes from ¾" to 10½", for mounting directly or with an adapter. A cast steel housing (SAFS) is available for heavy duty applications.

For details, call one of our twenty-four offices. 5938



Spherical, Cylindrical, Ball, Tyson Tapered and REED Miniature Bearings

EVERY TYPE—EVERY USE

SKF®

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

*REG. U.S. PAT. OFF.

Simplifies Stress Analysis

Stress-analysis problems can be simplified with a new PhotoStress Rosette Gage. The Budd Company claims it's the first such gage to provide both orientation and separate magnitudes of principal strains. Applications include installation on automotive frames, aircraft and large missiles.

Die-Steel Gains Strength

Developed for hot pressworking and upsetting of both ferrous and nonferrous metals are two new die steels. The distinctive feature of these steels, is that they can be precipitation hardened. Either a tempering treatment or transfer of heat from the part being worked serves to increase the as-quenched hardness.

Tame "Wild Heat" Problem

New process removes hydrogen from steel by bubbling an inert gas through the molten bath. Unlike other degassing techniques, the inert gas enters the bath through the ladle bottom. Developers of the process claim that it takes no extra foundry time or labor, that it's ideal for homogenizing a metal bath and for giving rapid refining between bath and slag.

Mobile Acetylene Plant

Army engineers have designed a mobile acetylene plant that uses a hydrocarbon fuel rather than calcium carbide. The plant offers a number of features for field production of acetylene for cutting and welding. These include higher output and relatively non-hazardous raw materials.

Guard Zinc-Alloy Chemistry

Key to the production of zinc alloys for die-casting is close chemical control. J. L. Kimberly, executive vice president American Zinc Institute, says, "Unless the control of zinc-alloy composition is properly established and administered, all other controls and safeguards may well prove to be of secondary importance." He also says that, despite steps taken to correct zinc die-casting failures, misunderstanding still persists among some newcomers to the field.

Motion: A Dead Give-Away

Maximum security can be put into effect in the plant and office with a unique new motion detector. Here's how it works. The area is first saturated with a pattern of radio-frequency energy. Any motion, however slight, into or within the saturated area interrupts the standing wave pattern. This causes a voltage change at the sensor unit which causes both audible and visual alarms in the control station.

Make Fluorspar Briquettes

Acid-grade fluorspar is now available in briquette form. In addition to improved handling and receiving efficiency, a number of other advantages are claimed. There are no handling, storage, and charging losses due to fines. Fluorspar is absolutely dry due to the briquetting process which affects its crystal structure.

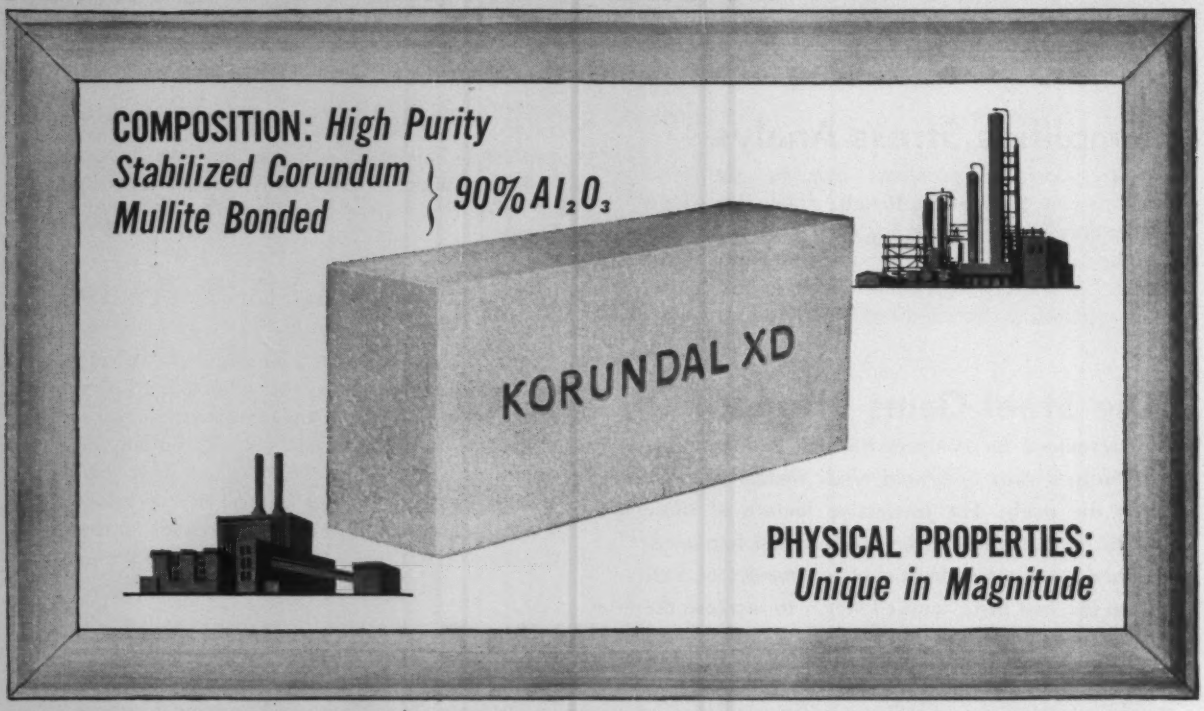
Protects Tungsten Wires

With a melting point of 3180°C and a boiling point of 5900°C, rhenium offers good protection when plated on other materials. Battelle scientists find that it can be electroplated on tungsten wires under the following conditions: use of a nickel-cathode surface; an ammonium-perrhenate sulphuric-acid bath containing ammonium nitrate; a bath temperature of about 90°C; and current density of 18 amp per sq dm or more.

New Welding Evidence

New facts on friction welding have been uncovered. Researchers at American Machine & Foundry Co. find that a layer of fluid metal forms at the interface of the metals being welded. Existence of this fluid has not been discussed in foreign papers. Instead, Russians theorize that it's the heat of friction, developed between the abutting, rotating parts, that produces the temperature needed for pressure welding.

PICTURE OF A MARVELOUS REFRACTORY



by HARBISON-WALKER REFRACTORIES CO.

The extraordinary combination of individual superior properties of KORUNDAL XD is not matched by any other refractory. To builders and operators of high temperature furnaces, the following engineering information will prompt unusual interest for the fulfillment of extremely rigorous requirements. With KORUNDAL XD used in vulnerable positions in various furnaces, it becomes possible to operate economically under more severe conditions with the resultant higher rates of production and improvements in quality of products.

PRECISE PHYSICAL DATA — Illustrating Values of Highest Degree

Refractoriness (Al_2O_3-SiO_2 binary curve)	3500°F.
Apparent Porosity (unusually low)	14–15%
Highest Mechanical Strength	
Cold Crushing Strength, psi	15000+
Transverse Strength	
Modulus of Rupture, psi	2600+

UNPRECEDENTED PHYSICAL PROPERTIES

Reheat Test
At 3140°F.
% Linear Change — no shrinkage with slight tendency to negligible expansion

PROPERTIES OF PRE-EMINENCE AMONG REFRACTORIES

Load Test, 100 psi — 4 times load of A.S.T.M. Test
% Linear Subsidence
At 3000°F. 0.0
Transverse Strength Test
Modulus of Rupture at 2500°F. ..... Ave. 1800 psi
Panel Spalling Test
% Loss
Preheat — 3000°F. 0.0

IMPORTANT BENEFITS FROM PARTICULAR PROPERTIES FOR SPECIFIC USES

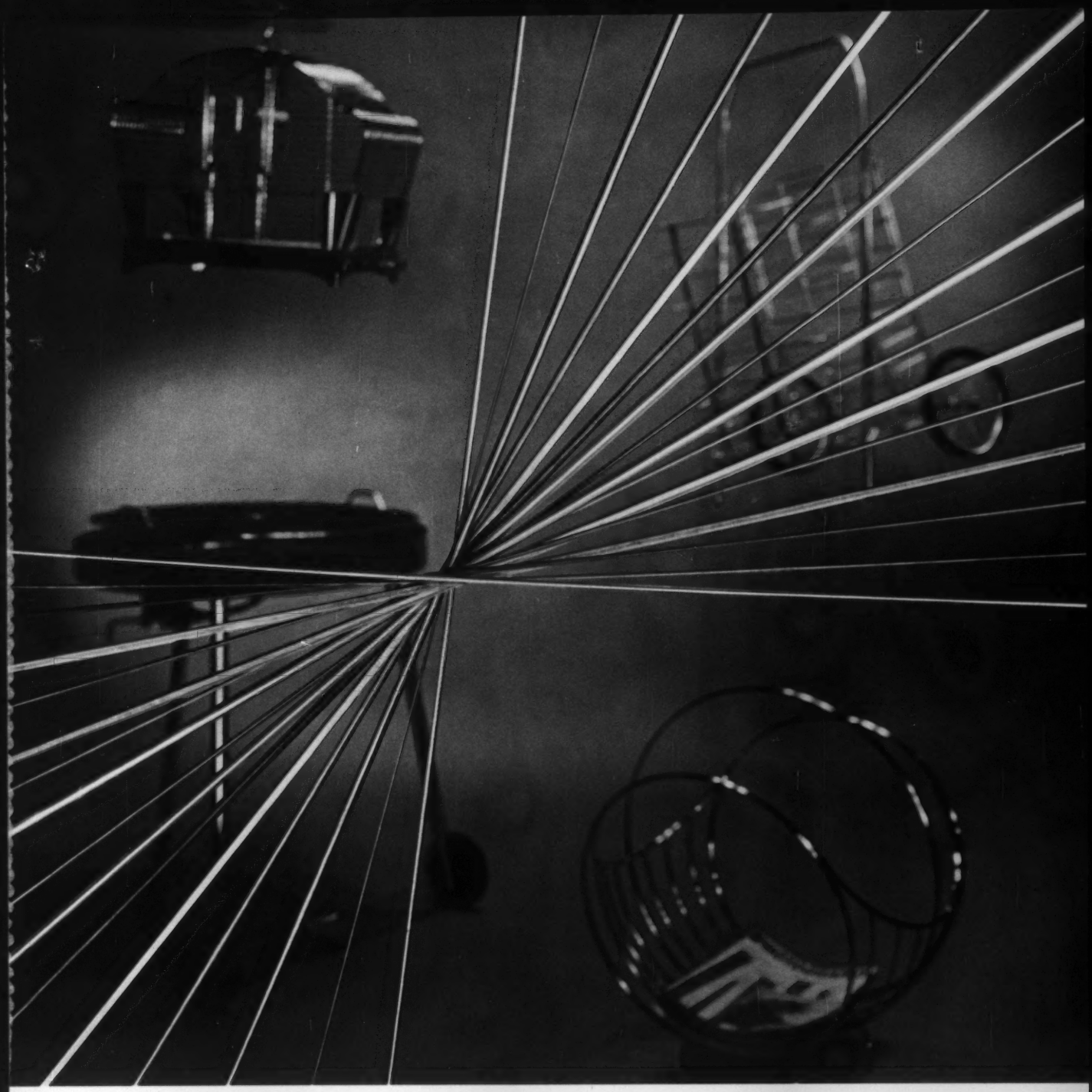
PROPERTIES EXTRAORDINARY	USES
GREAT HIGH TEMPERATURE STRENGTH	Tunnel Kiln Car Tops Setter Tile Piers High-Heat Release Furnaces
RESISTANCE TO IMPACT AND ABRASION	Heating Furnace Bottoms Rotary Kiln Discharge End Blocks and Dams
RESISTANCE TO EROSION — LOW POROSITY AND PERMEABILITY RESISTANCE TO PENETRATION BY GASES AND SLAGS	Molten Metal Tapping Blocks Recuperator Tubes Funnels Induction Furnaces
CHEMICAL COMPOSITION — CORROSION RESISTANCE	Vulnerable Parts of Glass Tank and Silicate of Soda Furnaces Immunity to Oxidizing and Reducing Atmospheres
THERMAL SHOCK RESISTANCE	Property of Great Importance in Many Applications

With KORUNDAL XD of splendid workmanship now commercially available in virtually any desired shape, it is serving many established uses with improved results. Numerous other important applications will suggest themselves for conditions of extreme severity and its use could contribute materially in the development of new industrial processes.

HARBISON-WALKER REFRACTORIES COMPANY

AND SUBSIDIARIES General Offices: Pittsburgh 22, Pa.

® *World's Most Complete Refractories Service*



Need steel wire?

Bethlehem makes nearly all kinds

Steel

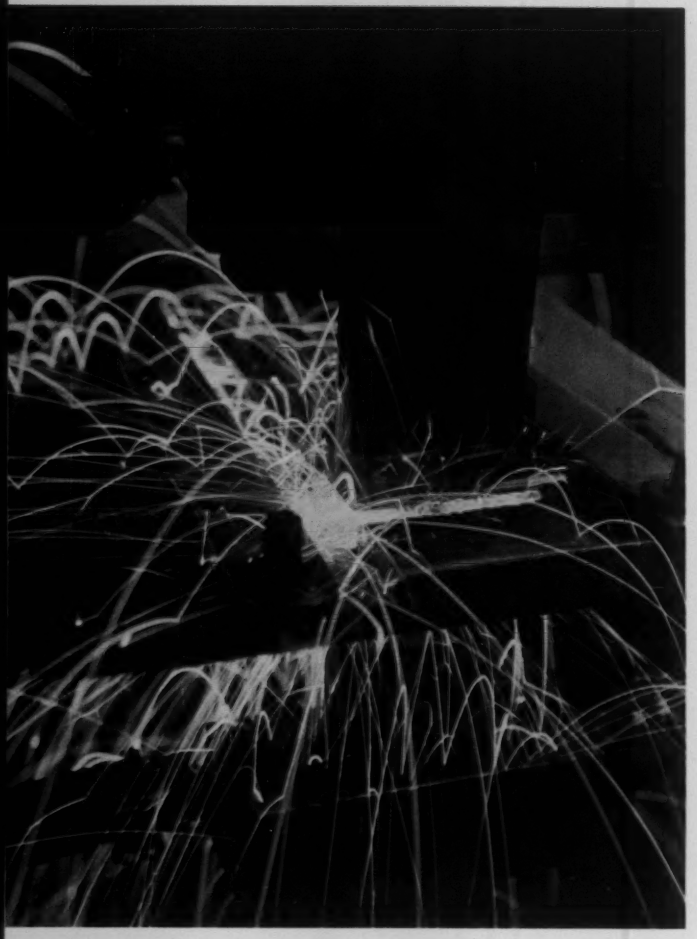
for Strength
. . . Economy
. . . Versatility

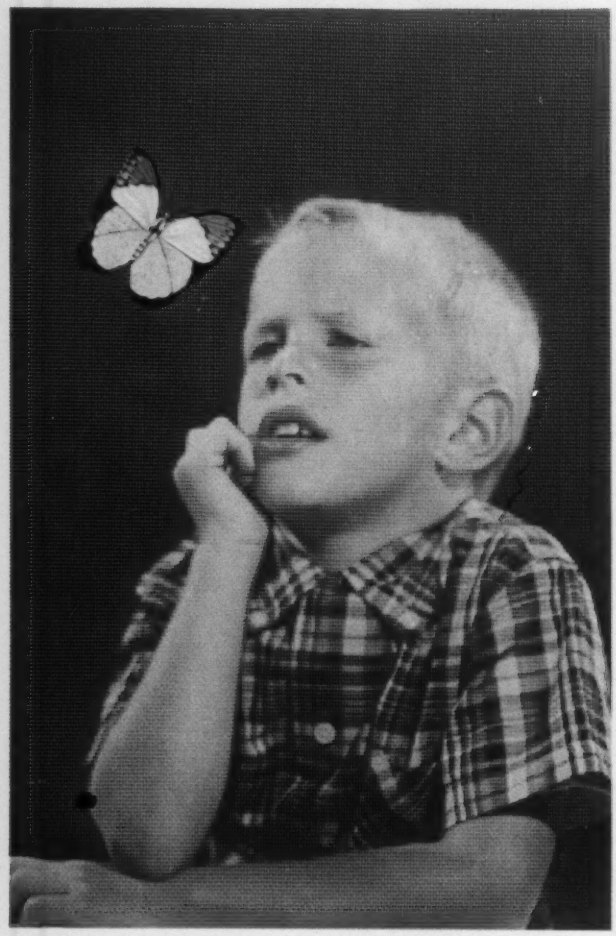
Analyses: Low-, medium-, and high-carbon; many alloy grades. *Finishes:* bright, galvanized, bethanized (electrolytically zinc-coated), aluminum-coated, limed, and many special finishes. *Treatments:* annealed, lead-annealed, patented, and various special treatments to meet specific requirements. *Qualities:* industrial, cold-heading and cold-rolling, chain, stapling, ball, "scrapless" nut, upholstery spring, welding, and many others.

BETHLEHEM STEEL

BETHLEHEM STEEL

Weld it... weave it...





We furnished this manufacturer just what he wanted for the special wrench being welded here—wire that is strong, easy to shape, and has a clean finish that produces a sound weld . . . *the first time.*

Using the steel grade recommended by our metallurgical engineers, this customer has been turning out top-quality wire screening for many years. The efficient operation of the wire in swift-working, automatic looms is a result of the freedom from defects which is "built into" the steel.

Whatever you do with steel wire

Steel

for Strength
. . . Economy
. . . Versatility

Bethlehem supplies steel wire for all of the various manufacturing processes from cold-heading to coiling. Our metallurgists are always available to help select the correct type of wire for your job. And they can often give you practical advice that helps to trim your production and handling costs.

form it... coil it... twist it!

Laundry and shopping carts must take rough handling, as well as resist corrosion. This wire former has found that the wire we recommended forms easily, and helps them turn out a laundry cart that is light, easy to handle, and durable.

Bethlehem designs an upholstery spring wire specifically for coil springs that hold through years of active family use. For years we have supplied leading spring-makers. These innersprings are coiled from Bethlehem Silver Star Spring Wire for a quality line of mattresses and upholstered products.

In the handy household brush Bethlehem wire is brought to the housewife's doorstep. We supply this brush-maker with an electrolytically zinc-coated steel wire which is twisted into brush handles. Bethlehem's easy-forming, bethanized wire takes this severe twisting, holds the bristles, and gives long service.

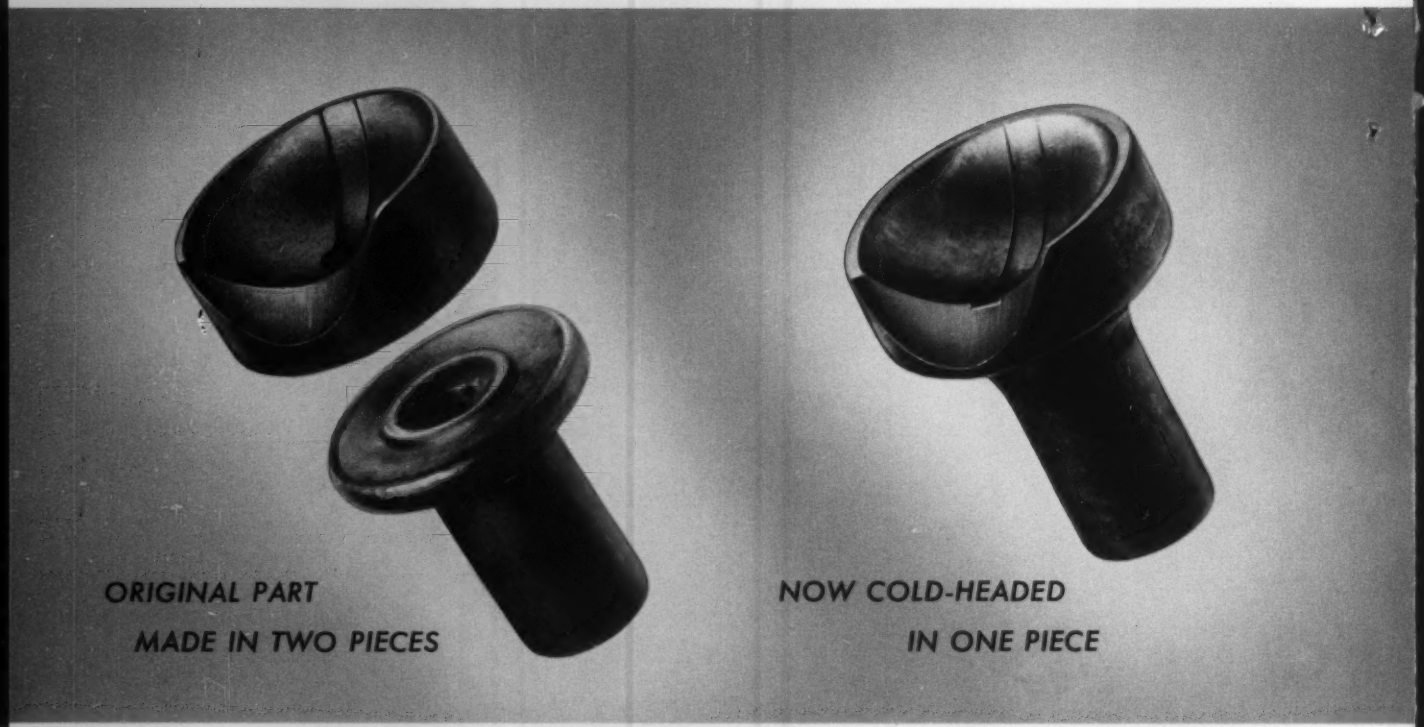
...Bethlehem can supply it

BETHLEHEM STEEL

BETHLEHEM STEEL

cold-head it...

When you're going to cold-head a product, the wire has to be just the right grade. A special type of Bethlehem cold-heading wire was developed by Bethlehem's metallurgists for this component of an automotive steering-rod relay system. The two-piece part, comprising a stud and a seat, has been replaced by a single part which is now cold-headed at a considerable savings.



Bethlehem supplies steel for virtually every use

Here's a partial list of steels and specialty products in the Bethlehem line:

BARS AND BILLETS:
Carbon and alloy AISI grades
Concrete reinforcing bars
Leaded steels
Special rolled sections

TOOL STEELS:
Water, oil, and air-hardening grades

FORGINGS:
Drop, press, hammer, and upsetter
Rolled-and-forged sections

ROD AND WIRE:
Hot-rolled rods, wire, and wire products

SHEETS:
Hot- and cold-rolled
Continuously galvanized
Enameling sheets

TIN MILL PRODUCTS:
Electrolytic and hot-dip tinplate; blackplate

PLATES:
Universal and sheared
Flanged and dished heads

WIRE ROPE AND SLINGS

FASTENERS:
Bolts, cap screws, rivets
Special fasteners

STEEL PIPE:
Continuous butt-weld
Electric resistance-weld

STRUCTURAL SHAPES

COLD-FORMED SHAPES

PALLET RACKS

WELDMENTS:
Frames, tanks, housings, vessels

FREIGHT CARS, PARTS, WHEELS, AXLES

RAILS:
Tee, crane, girder

CASTINGS:
Carbon, alloy, stainless steel
Iron, brass, bronze

Publications Dept.,
BETHLEHEM STEEL COMPANY
Bethlehem, Pa.

Please send me information on steel wire for use in .....

Also send me information on.....

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Name.....

Company.....

Address.....

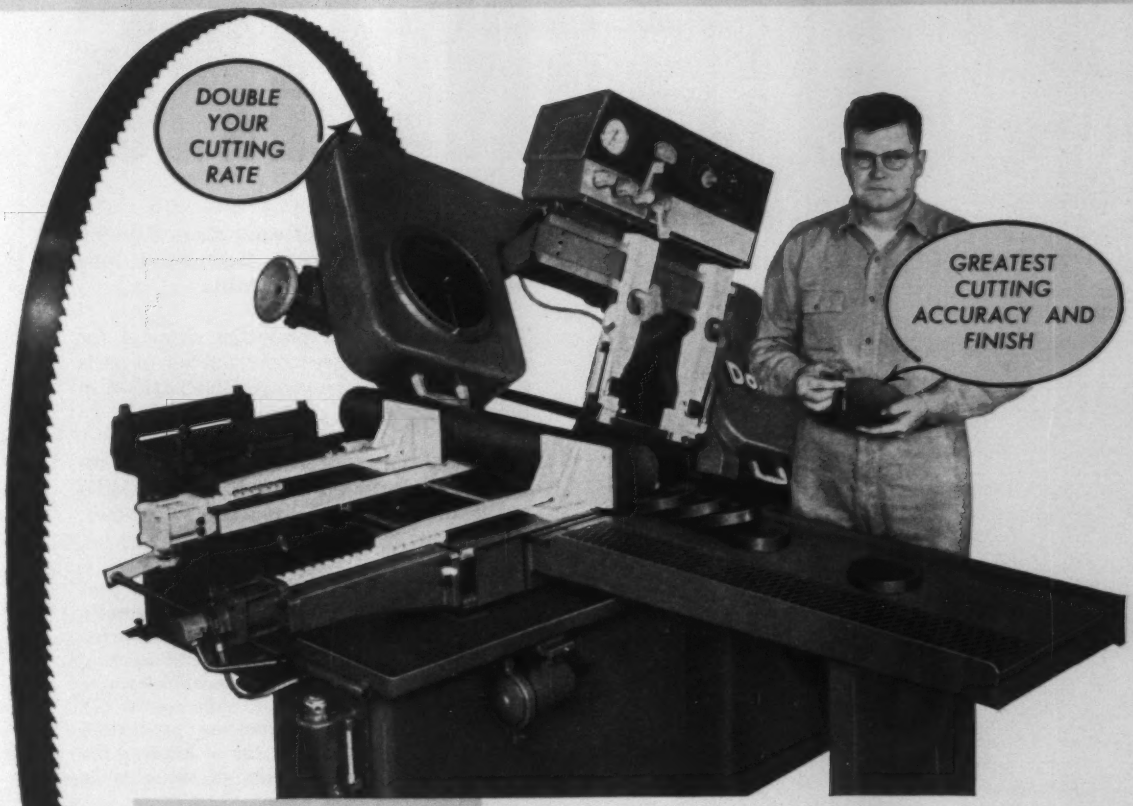
City..... *Zone*..... *State*.....

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

NEW DoALL Machine Tool With NEW Tungsten Carbide Blade



New Cut-Off Rates

MATERIAL	SIZE	DoALL TIME
4340	7" dia.	2.9 min.
1018	6-3/16" dia.	1.25 min.
1020	5" dia.	49 sec.
18-8 Stainless	7" sq.	8 min.
Stentor	6" dia.	3.8 min.
1117	3⅛" dia.	27 sec.
1020	6" dia.	1.2 min.
4340	11¾" dia.	8 min.
Ketos	11¾" dia.	8 min.
4140	5¼" dia.	2 min.
8620	10½" dia.	7.5 min.
4150	9" dia.	5 min.

Wait till you see this team cut your stock to lengths. It's terrific! With tremendous cutting ability, DoALL's revolutionary TUNGSTEN CARBIDE Saw Band on an entirely new power saw is the team that wins again. It delivers by far the fastest cutting rates ever achieved by any band tool cut-off saw, together with the remarkable accuracy and finish for which the DoALL Power Saw is famous.

Automatically operated, the machine has the power to drive the TUNGSTEN CARBIDE Band up to 450 fpm. It offers broad feed force range, self-adjusting carbide-faced saw guides, automatic chip conveyor, plus many other features.

For lowest cost, highest cut-off productivity, mail us this coupon . . .

PS-18

This is a typical DoALL Store

ASK FOR A DEMONSTRATION TODAY!

THE DoALL COMPANY, Des Plaines, Illinois

We would like to see a demonstration of the new DoALL C-70 TC Power Saw in our plant—without cost or obligation.

Name _____

Company _____

Address _____

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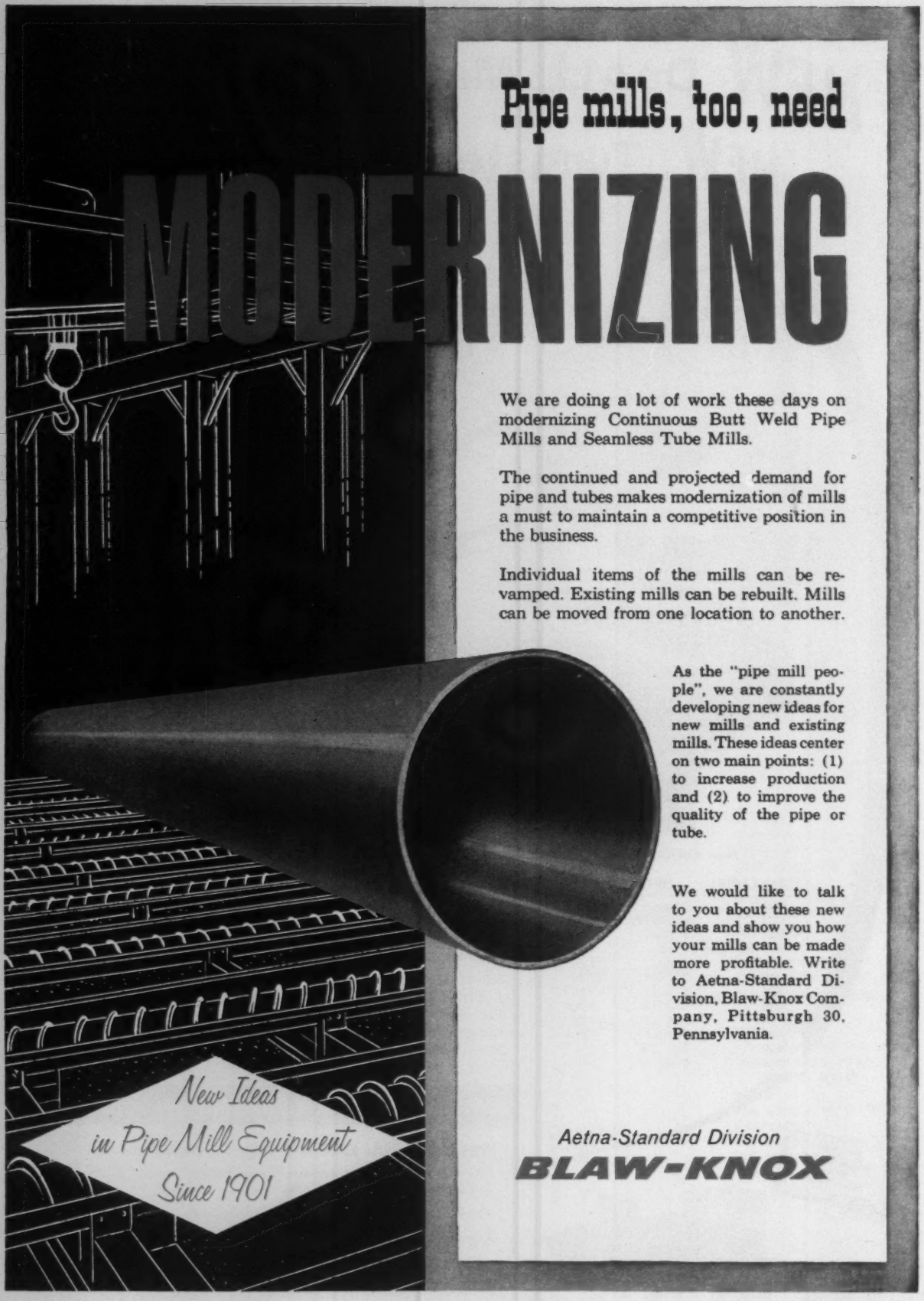


Pipe mills, too, need MODERNIZING

We are doing a lot of work these days on modernizing Continuous Butt Weld Pipe Mills and Seamless Tube Mills.

The continued and projected demand for pipe and tubes makes modernization of mills a must to maintain a competitive position in the business.

Individual items of the mills can be revamped. Existing mills can be rebuilt. Mills can be moved from one location to another.

As the "pipe mill people", we are constantly developing new ideas for new mills and existing mills. These ideas center on two main points: (1) to increase production and (2) to improve the quality of the pipe or tube.

We would like to talk to you about these new ideas and show you how your mills can be made more profitable. Write to Aetna-Standard Division, Blaw-Knox Company, Pittsburgh 30, Pennsylvania.

Aetna-Standard Division
BLAW-KNOX

Inside of ILO

Sir—

Recently I read an article in the IRON AGE on the International Labor Organization and its plans to expand its programs (IA Oct. 13, '60, p. 9). I'm interested in getting more business executives familiar with what's going on in the ILO.

The ILO, conceives of itself as an international parliament. It has, under the guise of helping the working man, passed resolutions and recommendations and enacted conventions dealing with the education of farm children, life insurance, health and hospitalization, plant cafeterias, childbirth, immigration, employment of capital, government regulations of markets, prices, production, and employment, and other subjects far beyond the sphere of working conditions, wages and hours, and collective bargaining—its announced original field.

Red Dominated—Browbeaten by communists and composed largely of socialists, the ILO leans always toward collectivist measures. Its tripartite composition (each country sends to ILO conferences delegations representing government, labor and employees) provides the government-labor majority with an international forum in which to denounce, abuse, and out-vote the employer delegates.

Furthermore, in recent years, more and more of the employer delegates themselves—all of those from the communist countries—represent nationalized industries, and are therefore dedicated to collectivism.

Its first attempt to inject itself into the management field failed. This was an effort to promote "co-determination." This is a system under which half of the directors of an industrial enterprise are chosen by the stockholders, and the other half by the union. This scheme is not dead.

But "progress" along this line may be slow. So a new plan has been devised—a "Management Development Program," sponsored and directed by the ILO.

No Distinction—No distinction is made between privately-owned and government-owned enterprises. The idea seems to be that each "backward" nation would establish a sort of "management institute" staffed jointly by "experts" which its government would furnish, and by ILO personnel. The ILO already has "missions" in countries all over the world.

One observer has remarked that "technical assistance" consists largely of teaching workers how to organize and how to strike; although, according to official ILO reports, much of the "assistance" consists of showing governments in primitive areas how to set up systems of social security.

The schools, says the Director-General's report, would be for top and middle management. They would not deal with "training in such specialized fields as industrial engineering, personnel management or the training of supervisors." Instead, the program would "assist in the establishment of facilities whereby members of management may acquire a sound understanding of the nature of industrial operation and of the economic, social, technological and human factors" involved. Oh, it would be on a distinctly high level.

So, what will the management schools teach?

Reflecting ILO majority membership and philosophy, they will teach managers how to let unions and government take over the running of a business, under an economic system of collectivism.

Here, under the guise of "doing good" for underprivileged people, is as beautiful a scheme of collectivist indoctrination as ever was devised. And U. S. taxpayers are paying 25% of its cost.—Don Knowlton, Hill and Knowlton of Cleveland.

NEWCO

offers consistent uniformity in Oil-Tempered

CHROME SILICON

and

CHROME VANADIUM

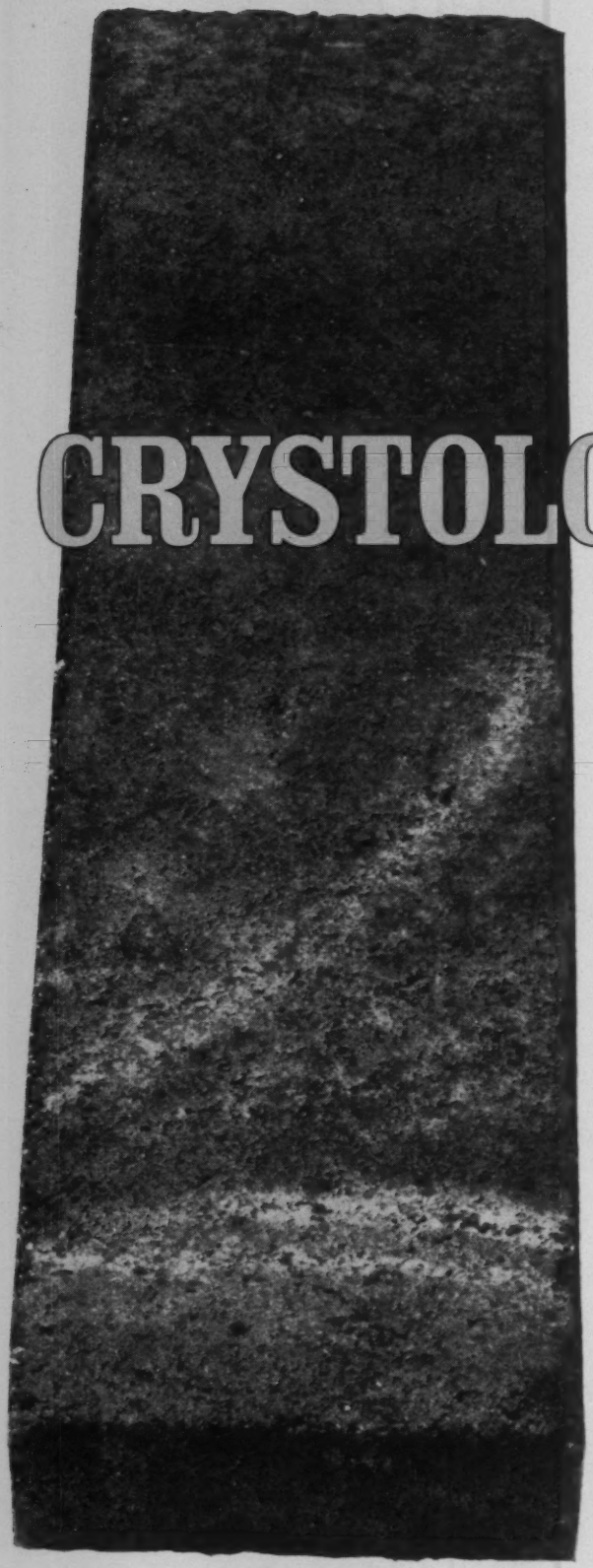
Wires

● Send for current NEWCO stock list.

NEW ENGLAND HIGH CARBON WIRE CORP.

MILLBURY, MASSACHUSETTS

Offices and warehouses: Cleveland, Detroit, Los Angeles, Melrose Park and Millbury



Now...a low-cost Nitride-Bonded Silicon Carbide!

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Now, the best-performing silicon carbide refractory is available at a realistic price! Brand-new CRYSTOLON "63" permits the use of a cost-saving nitride-bonded silicon carbide refractory for hundreds of applications.

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FATIGUE CRACKS

Business Comments On the Election

We'd like to call attention (we'd say "point with pride" if we were running for election) to this week's Special Report on how business reacts to the election of Sen. John Kennedy. (P. 105.)

In doing so, we thought you might be interested in some of the sidelights that ordinarily don't get into print.

The Preparation — It's obvious that we had to do some advance planning. For example, we made up alternate covers in advance to be ready for either side. But other than that, all we could do was wait until Wednesday morning, then get to work.

We had anticipated greater difficulty in getting businessmen to be quoted in case of a Kennedy victory. But if that's the case, it didn't show up in our report.

We find that most businessmen, regardless of party, feel that it is their right and duty to speak up on the issues as they see them. Apparently, they are confident that they gain only respect from a forthright answer. This, to us, is one of the most encouraging results.

Long Story — But there was a great deal of off-the-record grumbling, too. And, by coincidence; here are two almost identical comments that came across the news desk from our regional editors.

"Election results left Pittsburgh industrialists with long faces."

"Cleveland businessmen, generally, are wearing long faces."

As the reports came in, we asked news editor Richard Raddant for some of his comments on the reaction of businessmen to the Democratic victory.

"Probably the subject most mentioned, and of most concern, is the danger of inflation," he reports. "Many others are concerned about greater Federal controls over business, higher taxes, and the general fear of 'big government.'

The Optimism — "But other industrialists, particularly in defense industries, believe that business will pick up. This is the logical result of belief that defense spending will grow under the Democrats.

"Many businessmen whom we know personally are bitterly disappointed, but are adopting a close-ranks attitude and hesitate to condemn Sen. Kennedy before he has a chance to do anything.

"Probably the most significant thing is that almost everyone, even those who worked hard for the Vice President, have great faith in the nation and it's ability, if you'll pardon the expression, to move ahead."

That's our report on the report.

Conversation Piece

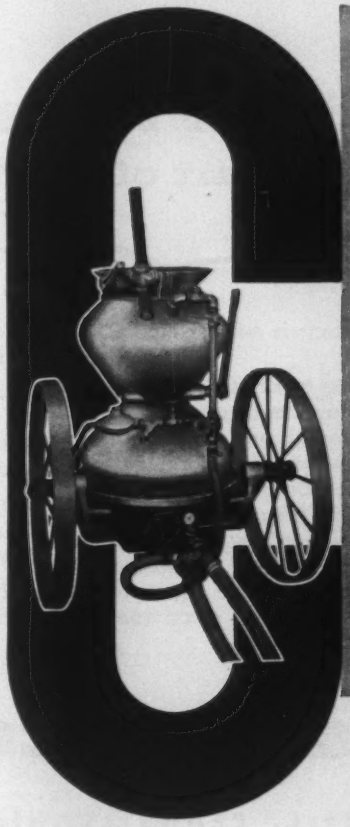
If, while riding in the clubcar or some other popular conveyance, you see an executive type talking to his attaché case, don't fumble for your analyst's phone number, or do anything similarly drastic. It may seem strange, but that's just what you'll probably be seeing.

The U9, introduced this week by Minitronics, Inc., Philadelphia, is an attache' case wired for sound, with a built-in microphone and a miniature tape recorder.

The mechanism is so small that it is not visible when the case is opened. Turned on and off by an invisible w i r e l e s s control and powered by a single small battery, the case will pick up conversations 15 ft away.

A word of caution: If you notice someone slowly getting closer to your seat switch the conversation. He may be after your secrets.

These handy travel machines are retailing for from between $89.50 for the smaller models to about $500 for the super deluxe that has everything but a secretary.



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This 90" diameter ingot, of high alloy steel, weighs approximately 230,000 pounds. It will be forged on this giant forging press to produce a finished machined turbine rotor shaft, weighing approximately 70,000 pounds.

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COMING EXHIBITS

Power and Mechanical Engineering Show—Nov. 28-Dec. 2, Coliseum, New York. (American Society of Mechanical Engineers, 29 W. 39th St., New York 17.)

Plant Maintenance & Engineering Show — Jan. 23-26, International Amphitheatre, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

MEETINGS

NOVEMBER

American Mining Congress—Coal Div. conference, Nov. 18, Penn Sheraton Hotel, Pittsburgh. Headquarters, 1200 18th St., N. W., Washington, D. C.

Fluid Controls Institute—Fall meeting, Nov. 20-22, The Drake, Chicago. Institute headquarters, P. O. Box 667, Pompano Beach, Fla.

Electronic Industries Assn.—Winter conference, Nov. 29-Dec. 1, Fairmont Hotel, San Francisco. Association headquarters, 1721 DeSales St., N. W., Washington, D. C.

Iron & Steel Div., The Metallurgy Society of AIME—Annual Electric Furnace Committee conference, Nov. 30-Dec. 2, Morrison Hotel, Chicago. Society headquarters, 29 W. 39th St., New York 18, N. Y.

DECEMBER

American Institute of Chemical Engineers—Annual meeting, Dec. 4-7, Statler Hotel, Washington, D. C. Institute headquarters, 25 W. 45th St., New York.

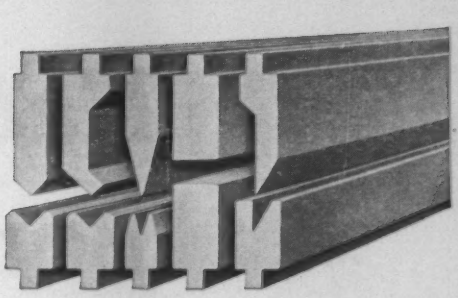
American Mining Congress—Annual membership meeting, Dec. 5, Plaza Hotel, New York. Headquarters, 1200 18th St., N. W., Washington, D. C.

The Electric Overhead Crane Institute—Annual meeting, Dec. 6, Carlton House, Pittsburgh. Institute headquarters, One Thomas Circle, Washington 5, D. C.

JANUARY

The Institute of Scrap Iron & Steel, Inc.—Annual convention, Jan. 8-

press brake tooling



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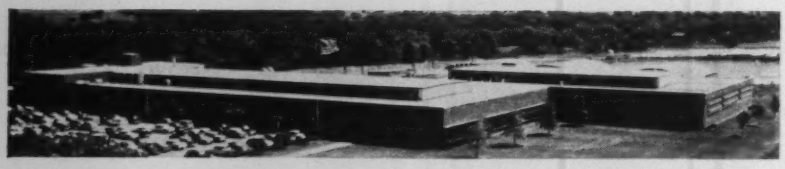

aluminum and ductile iron castings

BEAN

MEETINGS

11, Hotels Fontainebleau and Eden Roc, Miami Beach, Fla. Institute headquarters, 1729 H St., N. W., Washington 6, D. C.

Aluminum Window Mfrs. Assn.—Annual meeting, Jan. 9-12, Emerald Beach Hotel, Nassau, Bahamas. Association headquarters, 630 Third Ave., New York.

Society of Automotive Engineers, Inc.—Annual meeting, Jan. 9-13, Cobo Hall and Convention Arena, Detroit. Society headquarters, 485 Lexington Ave., New York, N. Y.

Hoist Manufacturers Assn., Inc.—Annual meeting, Jan. 10, Statler-Hotel, Cleveland. Association headquarters, One Thomas Circle, Washington.

Steel Shipping Container Institute, Inc.—Winter meeting, Jan. 17-18, St. Regis Hotel, New York. Institute headquarters, 600 Fifth Ave., New York.

Steel Plate Fabricators Assn.—Annual meeting, Jan. 18-20, Logo Mar Hotel, Fort Lauderdale, Fla. Association headquarters, 105 W. Madison St., Chicago.

Industrial Heating Equipment Assn., Inc.—Annual winter meeting, Jan. 23-24, Dearborn, Mich. Association headquarters, 2000 K St., N. W., Washington, D. C.

Instrument Society of America—Annual meeting, Jan. 23-25, Hotel Astor, New York. Society headquarters, 313—6th Ave., Pittsburgh.

Society of Plastic Engineers, Inc.—Annual technical meeting, Jan. 24-27, Shoreham & Park Sheraton, Washington, D. S. Society headquarters, 65 Prospect St., Stamford, Conn.

Cutting Tool Manufacturers Assn.—Annual business meeting, Jan. 26, Harmonie Club, Detroit. Association headquarters, 1216 Penobscot Bldg., Detroit.

VAUGHN® at Aliquippa

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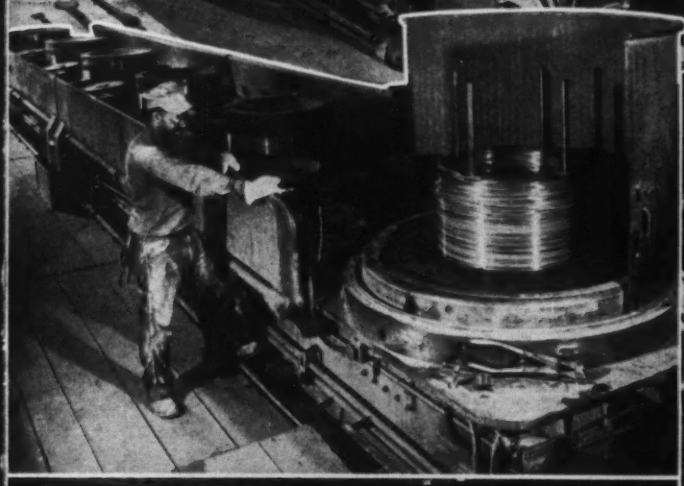

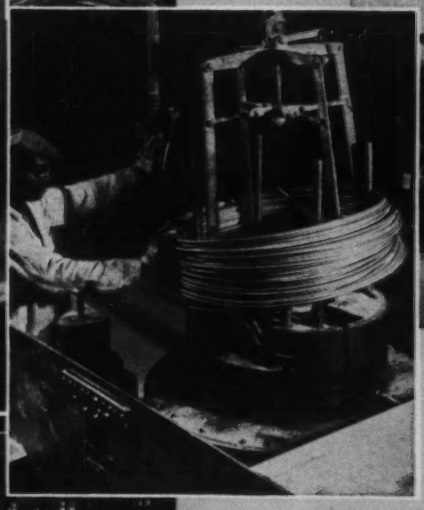

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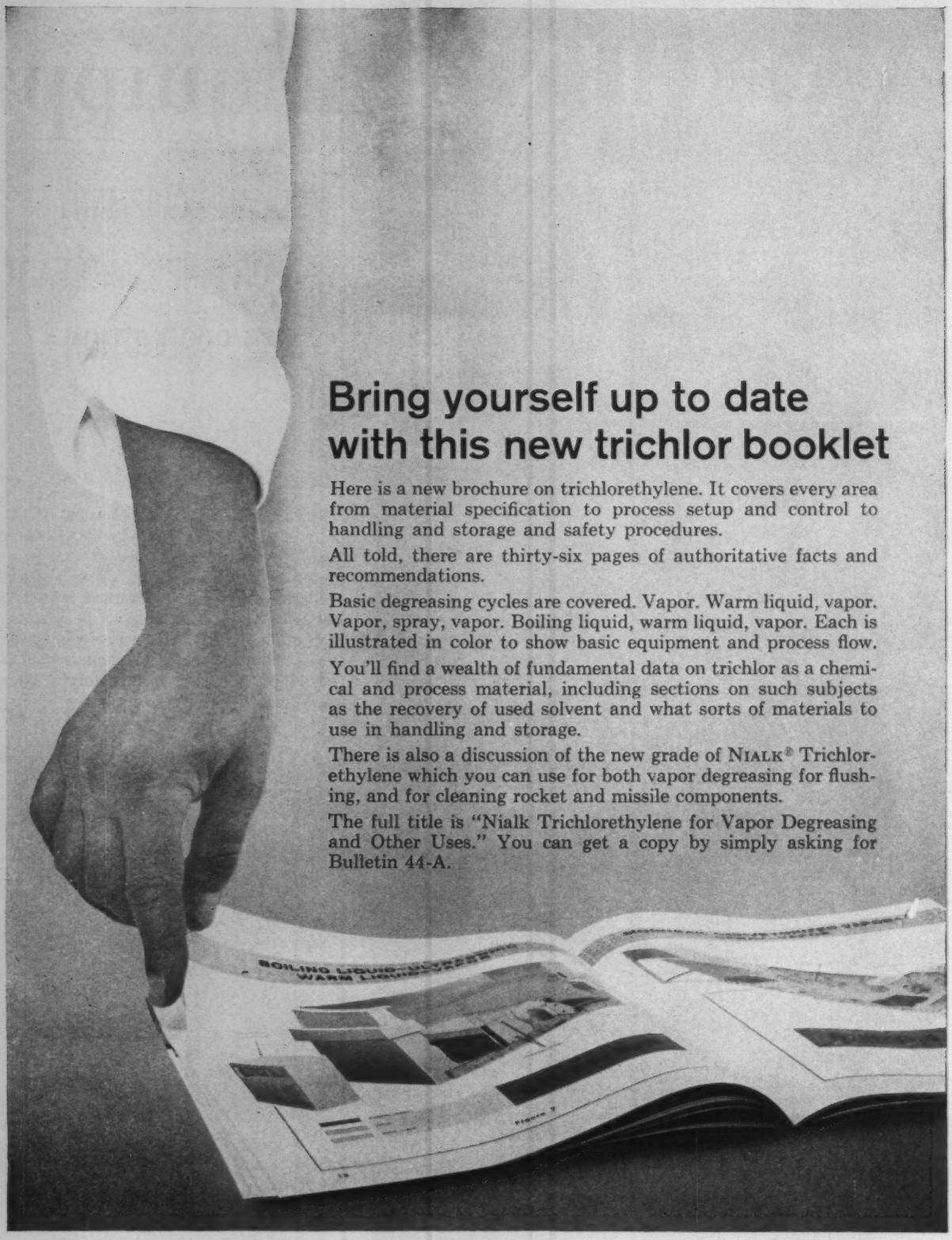

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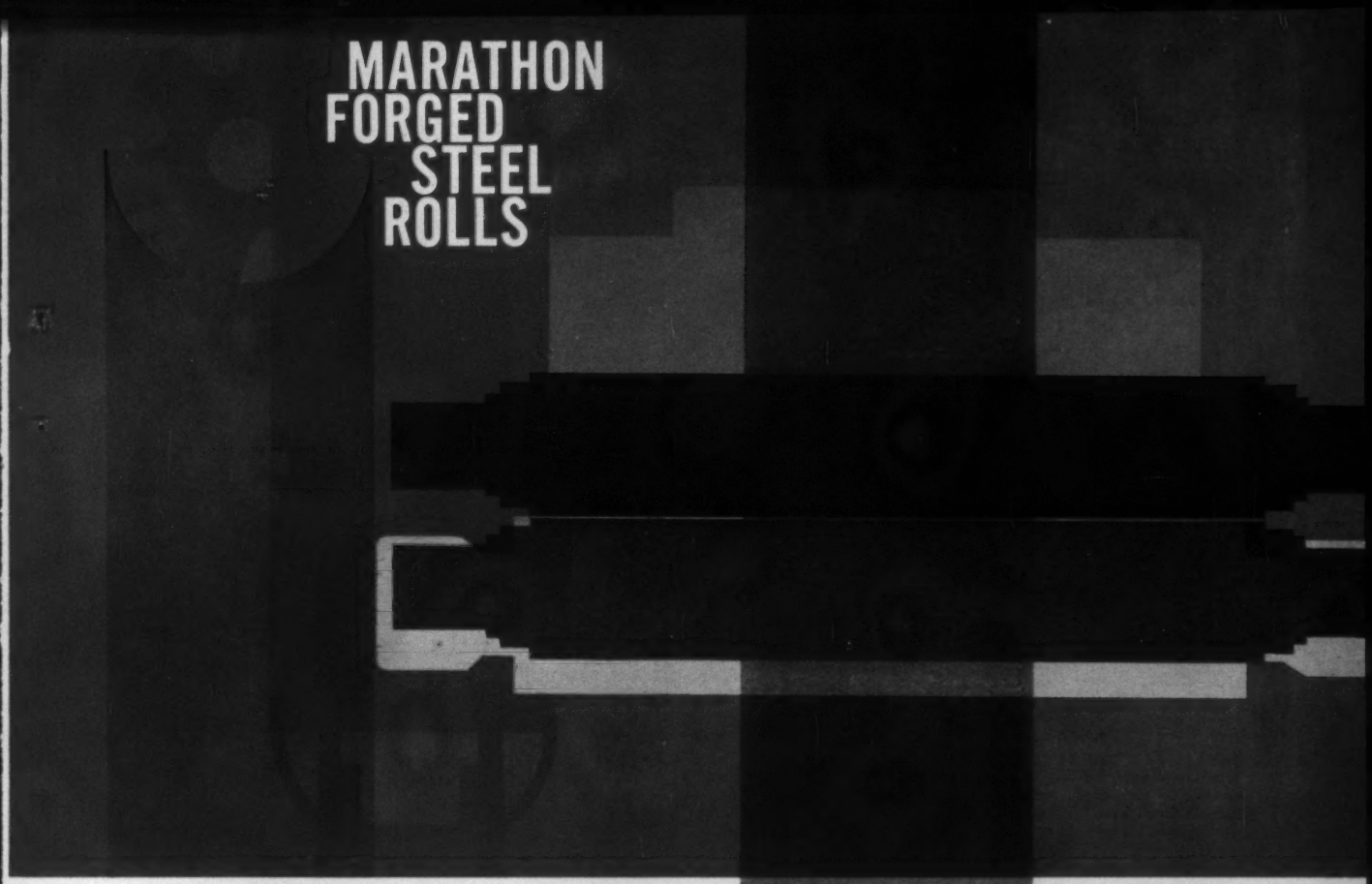

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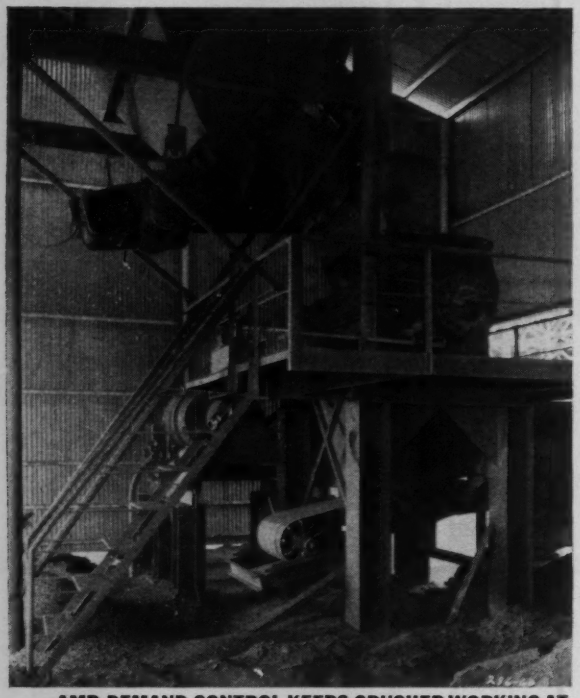

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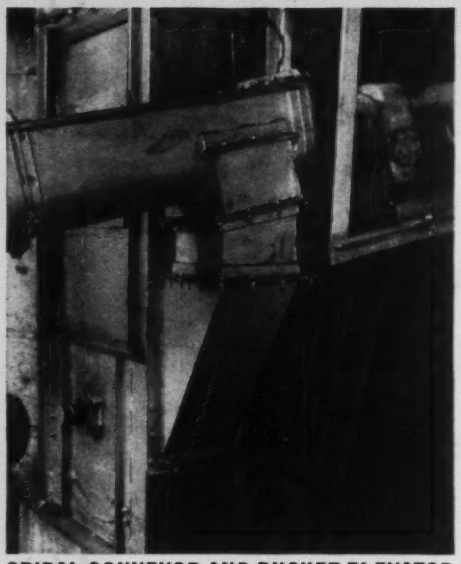

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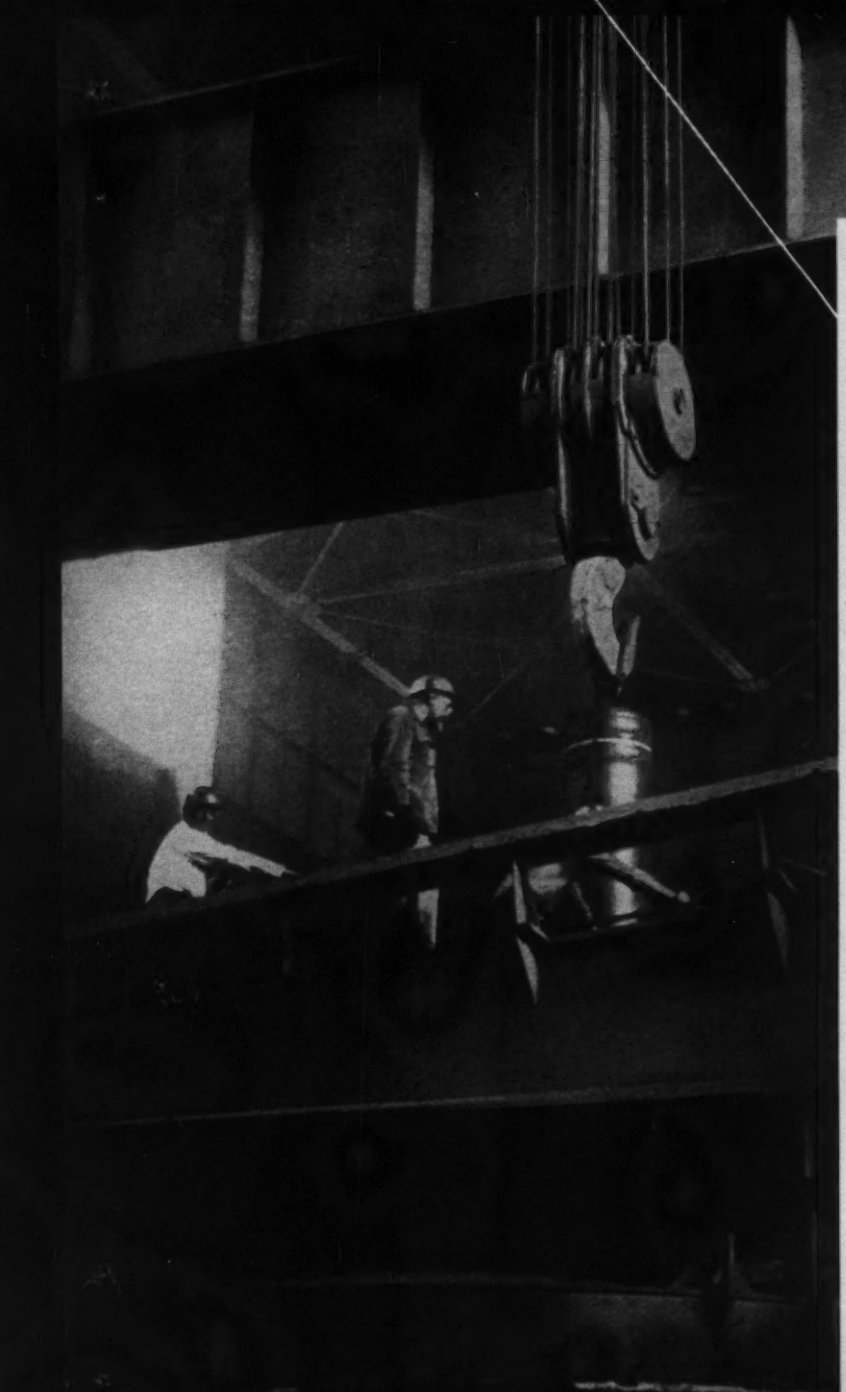

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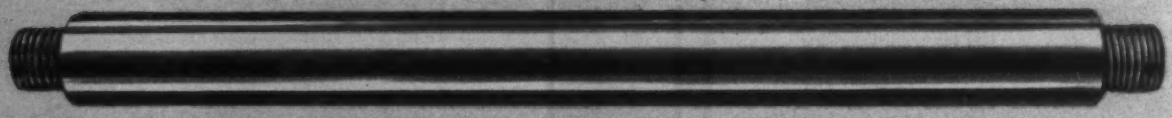

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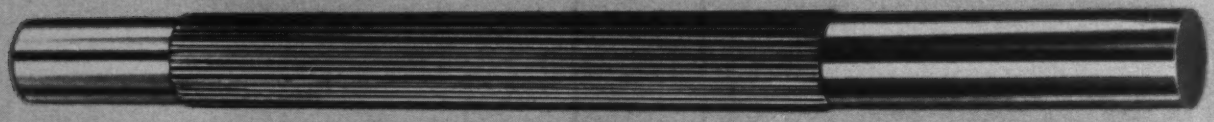

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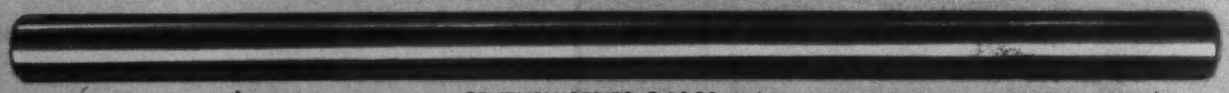
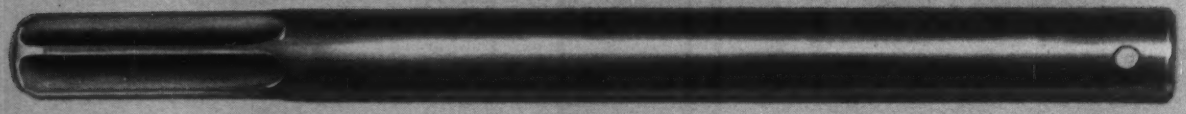


CENTURY SERIES C-1050 Axle



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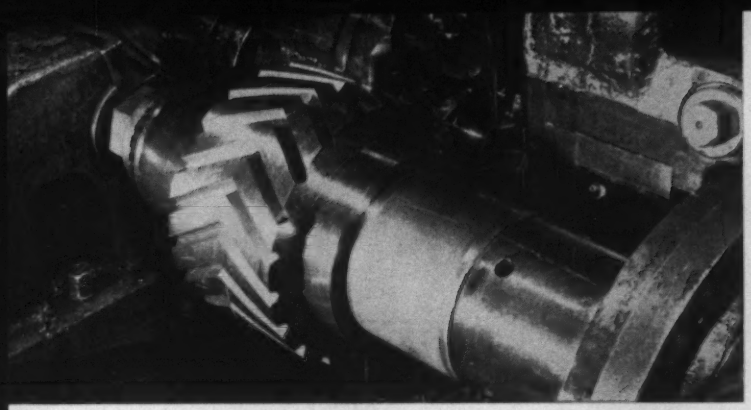

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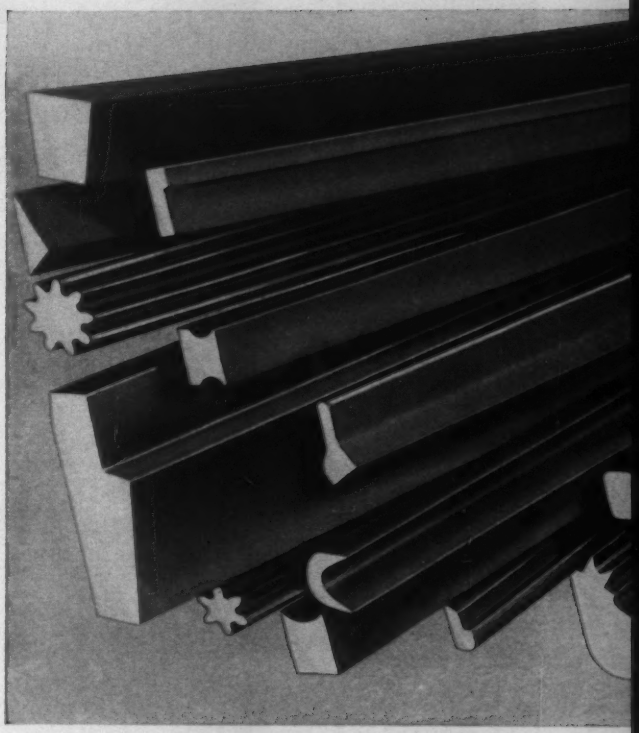

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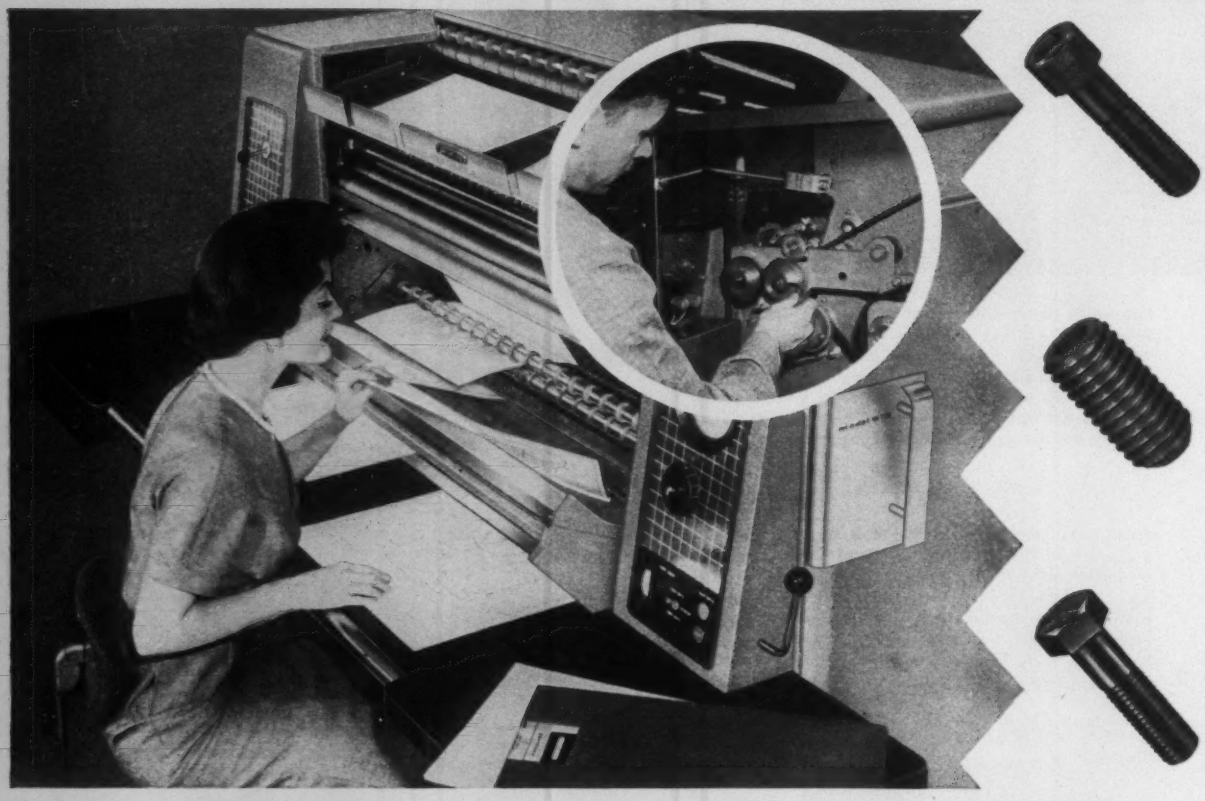
IT PAYS TO STANDARDIZE ON **STANSCREW**



Stanscrew suggests... BRUNING verifies... Socket set screws solve *Copyflex* problem

Charles Bruning, Inc., manufacturers of the widely accepted Copyflex, recently found that the fasteners they were using to attach the unit's sprockets and gears did not meet the rigid performance standards they set up for all component parts.

Bruning's distributor arranged a visit from a Stanscrew specialist, who recommended Stanscrew's regular socket set screws. Bruning verified their operational efficiency with exhaustive laboratory and engineering tests . . . made the conversion . . . and eliminated the loosening problem (plus eliminating many service calls).

Now, 100 Stanscrew fasteners are specified for each Model 675 Copyflex. In addition to socket set screws, they include socket head, hex head, and fillister head cap screws which are used in a wide variety of critical applications.

Like Bruning, more and more industrial leaders are learning it pays to standardize on Stanscrew. Their more than 5,500 different standard fasteners provide economical answers to the overwhelming majority of all industrial requirements . . . and are produced to consistent quality standards which eliminate production problems and lower assembly costs.

The Stanscrew fastener specialist may be able to help you cut fastener costs. Your Stanscrew distributor will be happy to arrange a prompt visit. Call him today.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

UNITED®

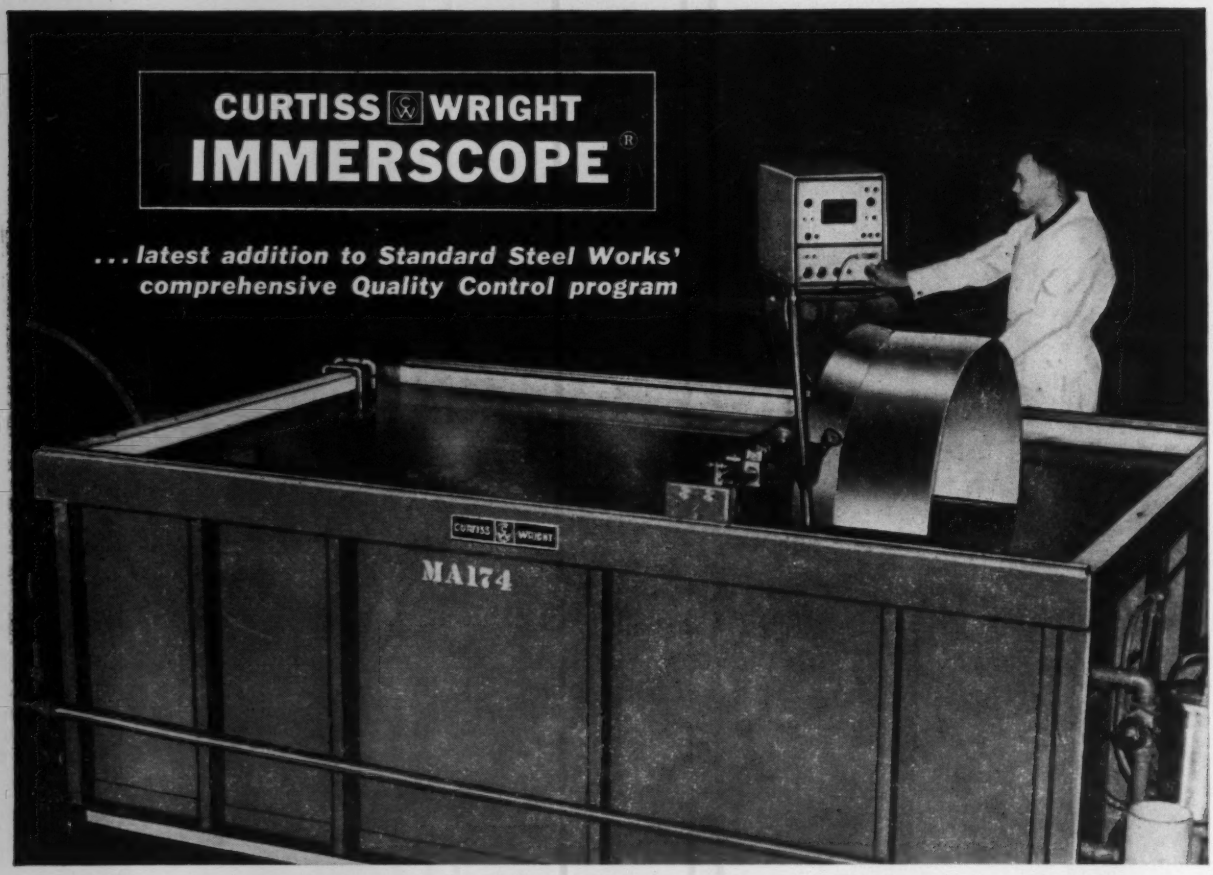
4-HIGH 6-STAND CONTINUOUS HOT STRIP MILL

UNITED ENGINEERING AND FOUNDRY COMPANY
PITTSBURGH, PENNSYLVANIA

Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio; Stedman Foundry and Machine Co., Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.



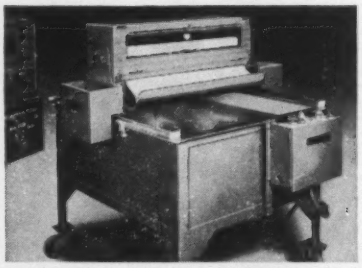
Sonic "eyes" take a piercing look for tiny, hidden flaws in complex steel shapes

Ultrasonic testing for tiny defects in vital parts with a Curtiss-Wright immersed inspection Immerscope is an important phase of the quality program at Standard Steel Works, major supplier of special alloy steel shapes of thin section and intricate forms. Because quality control at Standard is a highly regarded customer service, great emphasis is placed upon securing the most accurate, up-to-date testing equipment available in order to maintain a high level of accuracy.

Immerscope ultrasonic non-destructive testing is extremely versatile and accurate because of its range, rapidity of scanning and its high sensitivity in flaw detection. Variety of shapes and complexity of objects do not restrict complete inspection of the whole unit piece. Depth and relative size of flaws or voids are determined from the spacing and size of the pips on the cathode ray tube screen.

Defects as small as 0.0156″ can be detected within the steel part under inspection. The large illustration shows a thin-wall ring, resting on rollers in the tank. The operator is at the controls of Immerscope which provides electronic control and progressive indication of findings as the test is being made.

For additional information phone SWinburne 9-0500 or write:



Packaged units are available which range from this small portable unit, having a tank with inside measurements of 4′ long x 3′ wide x 18″ deep, to larger units with maximum dimensions of 54′ long x 12′ wide.

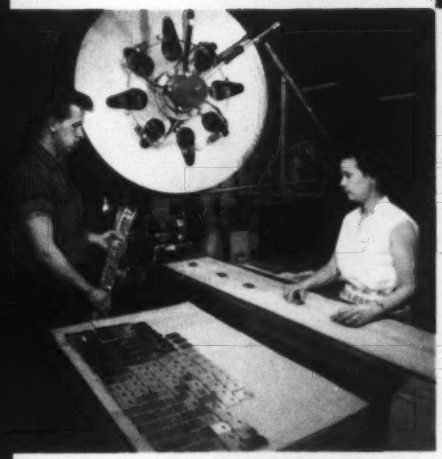
Princeton Division **CURTISS WRIGHT CORPORATION** Princeton, New Jersey

In CANADA: Canadian Curtiss-Wright Ltd. • 43 Westminster Avenue, North • Montreal 28, P. Q., Canada

Inquiries from qualified Manufacturers Rep. invited.

ACCORDION DOORS

HOME MAILBOXES



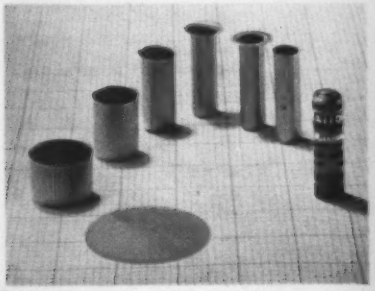
LUGGAGE LOCKS

LIPSTICK BASES

CABINET HARDWARE

HOW TO CUT COSTS, BOOST PRODUCT APPEAL WITH THOMAS STRIP PRE-COATED STEEL

please turn page



BATTERY CANS

BOILER TOPS

Pittsburgh Steel Company

Pittsburgh Steel Company

Luggage Locks—Brass Coated strip "strongly helped us compete against low-cost, brass plated imports." That's acclaim John A. Long, vice president-general manager, Long Manufacturing Co. Inc., gives Thomas Strip's brass coated steel. Long, of Petersburg, Va., is the nation's second largest luggage hardware maker. It was hard hit by foreign-made brass locks. "It was a crucial time in one of our big markets," says Sales Manager Edward C. Coleman. "We started looking for new methods and materials. Now, with new designs and using Thomas brass coated strip, we're able to fight foreign competitors." Eliminating plating and hand polishing with brass coated strip, buffed and lacquered on one side, Long trimmed 11 production steps. Result: 50% cost saving on compact-type luggage lock. Thomas Strip maintains product quality, helps Long increase die life; clear lacquer coat acts as lubricant in forming, prevents galling, and preserves product finish in inventory and in handling.

THOMAS STRIP: TRIMS METAL COSTS, SAVES PRODUCTION STEPS, UPGRADES PRODUCTS

Metal fabricators get a head start toward material and production savings with Thomas Strip's coated steel specialties.

Combining the beauty and utility of costlier metals with the strength, economy and formability of steel, Thomas Strip also offers greater product versatility, durability, buyer appeal and design potential.

Here are benefits available to you in Thomas Strip:

- **Shortens Manufacturing Cycle**—Precoated Thomas Strip is ready to fabricate when it's delivered. Initial preparation, cleaning, buffing, final finishing are already done in many cases—you're steps ahead in production.
- **Provides Economy of Steel**—By replacing more expensive metals, but retaining their finish or functional properties, precoated Thomas Strip reduces material costs.
- **Fabricates Easily**—Electrolytically applied, hot-dipped, painted or bonded, Thomas Strip coatings endure fabrication as readily as easy-to-work base steel.
- **Cuts Plating Costs**—Serving as final finish or as base for further plating or painting, Thomas Strip eliminates or at least reduces fabricators' piece-plating expense.
- **More Pieces Per Pound**—Precision rolling and plating to extremely close tolerances give maximum yield in parts per pound.

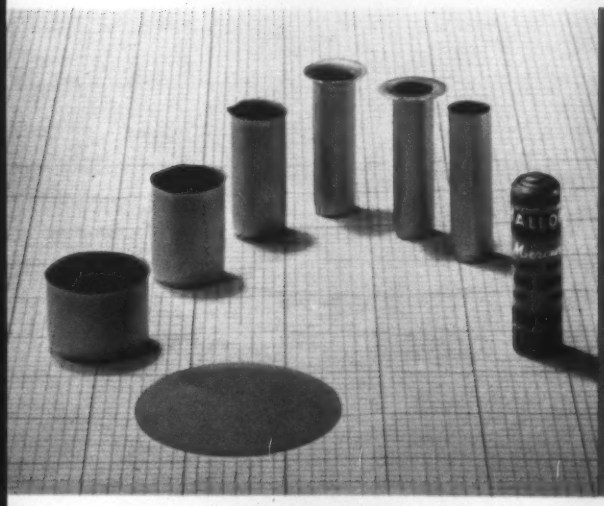
A study of the experiences of Thomas Strip users pictured on these pages should convince you of the benefits available to your product application—or to that product idea in the back of your mind. Read them.

If you need more convincing, detailed literature and samples are yours for the asking.

Better yet, contact one of the Thomas Strip District Sales Offices on the last page and ask for engineering or design help. And tell them you'd like to see our new slide film, "Bright, Modern Metals Provide Proof of the Pudding."

Accordion Doors—Plastic Coated Thomas Strip replaced hand laminating for "lead rail" of STEELITE plastic folding doors made by Clopay Corporation, Cincinnati, Ohio. Strip is roll formed with six 90° bends, ribbed and punched for rivets and door handle. Plastic endures stretching and compression. Also maintains "perfect lamination" to pass 100% inspection, says Purchasing Agent Lewis H. Washburn. Formed rails (left foreground) are assembled on rivet bench.

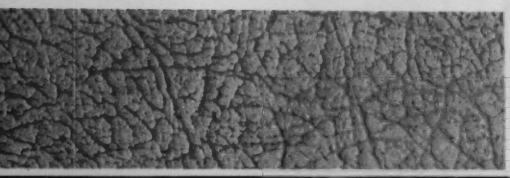
Boiler Tops—Lacquered Strip is spun formed by Edwards Engineering Corp., Pompton Plains, N. J., for boiler tops and top collars in packaged heating systems. Lacquer coat on Thomas Strip's aluminum-killed, drawing quality steel adheres without chipping or peeling. Edwards also uses lacquered strip to roll form back plates and front shields for baseboard units. Purchasing Agent John Bush says: "Thomas is more flexible and cooperative in giving us a quality product. We cut six steps, gained 1,500 sq. ft. of work space and eliminated fire hazards when we switched to prepainted strip. But most important, we can custom cut baseboard units to extra long lengths from prepainted coils." Edwards buys .029″ strip lacquered white on one side in 10.500″ and 5.625″ widths; 23″ width, beige lacquered on two sides.



Battery Cans—Nickel Coated Thomas Strip is used by Cly-Del Manufacturing Co., Waterbury, Conn., to produce mercury battery cases for P. R. Mallory Co. Example: RM-502 inner can, drawn by an Eyelet process from 2¼″ by .010″ strip. AK, non-scalloping steel with .000125″ nickel coat both sides must produce can 1.776″ by .506″ O.D. without draw rings, burrs, earing, peeling or flaking. Thomas has supplied nickel coated strip to Cly-Del nearly 20 years. "Precoated strip does this job better than if we plate after forming," says Purchasing Agent Raymond W. Drufva. "There's not much competition for Thomas in nickel coated strip for close tolerance work. It's the only producer able to supply the material we need for these battery cans."

Lipstick Bases—Copper Coated strip means a ⅔ material cost saving for Truelove & Maclean, Inc., Waterbury, Conn., Eyelet stampings specialists. Normally a brass part, a single style of this drawn shell, is produced at rate of 5 million yearly. Firm buys AK, non-scalloping, close gage (±.0005″) copper coated Thomas Strip for ductility, die lubricating and finish plating properties. Co-owners Tom Truelove and Don Maclean say: "We wouldn't attempt some of these jobs unless the material was copper coated steel. Generally it's no harder to work steel than brass when the steel is Thomas Strip's copper coated. There's not much competition for Thomas in this line." (Top photo shows copper coated lipstick bases being packaged with magnetic lifter.)

PATTERN ROLLED STEEL OFFERS UNLIMITED DESIGN OPPORTUNITIES



Home Mailboxes—Pattern Design. The Lady was looking for product appeal. She found it in pattern design sheet from Pittsburgh Steel Co. The Lady is Miss Jeanette L. Troy, director of purchases for The Randall Co. of Cincinnati, Ohio. She explains: "We were trying to find something new for our colonial style home mailboxes—a decorative effect that was different. Pittsburgh Steel's Pattern Design No. 101 gave us the appeal boost we were looking for—and without a proportionate cost boost."

Randall, a division of Textron Inc., produces the boxes for another Textron division, Wagner Manufacturing Co. of Sidney, Ohio. Industrial Engineer Wade Hartman says pattern design sheet saves 50 cents over a mailbox made of similar patterned materials. Rolled-in leather design shows no distortion in forming; permits full thickness of steel to be used in blanking, forming machines. Randall buys pattern sheets in commercial quality .024″ thick and in widths 39⅝″, 40¼″, 42⅞″.

Cabinet Hardware—Pattern Design—Thomas Strip's antique patterned steel helps Ajax Hardware Corporation of Los Angeles build strength and beauty into Early American cabinet hardware. President Norman D. Louis says: "Thomas Strip saves many hours by eliminating production steps. The uniformity of appearance, quality and workability of Thomas Strip's patterned steel makes it possible to match Ajax Early American cabinet hardware year after year. Production is fast because of Thomas Strip's close tolerances and formability." Ajax Hardware gives Thomas Strip's uncoated strip an electrolytic coating of rich antique copper or dull black. Photo shows packaging operation.

THOMAS STRIP DIVISION

Pittsburgh Steel Company

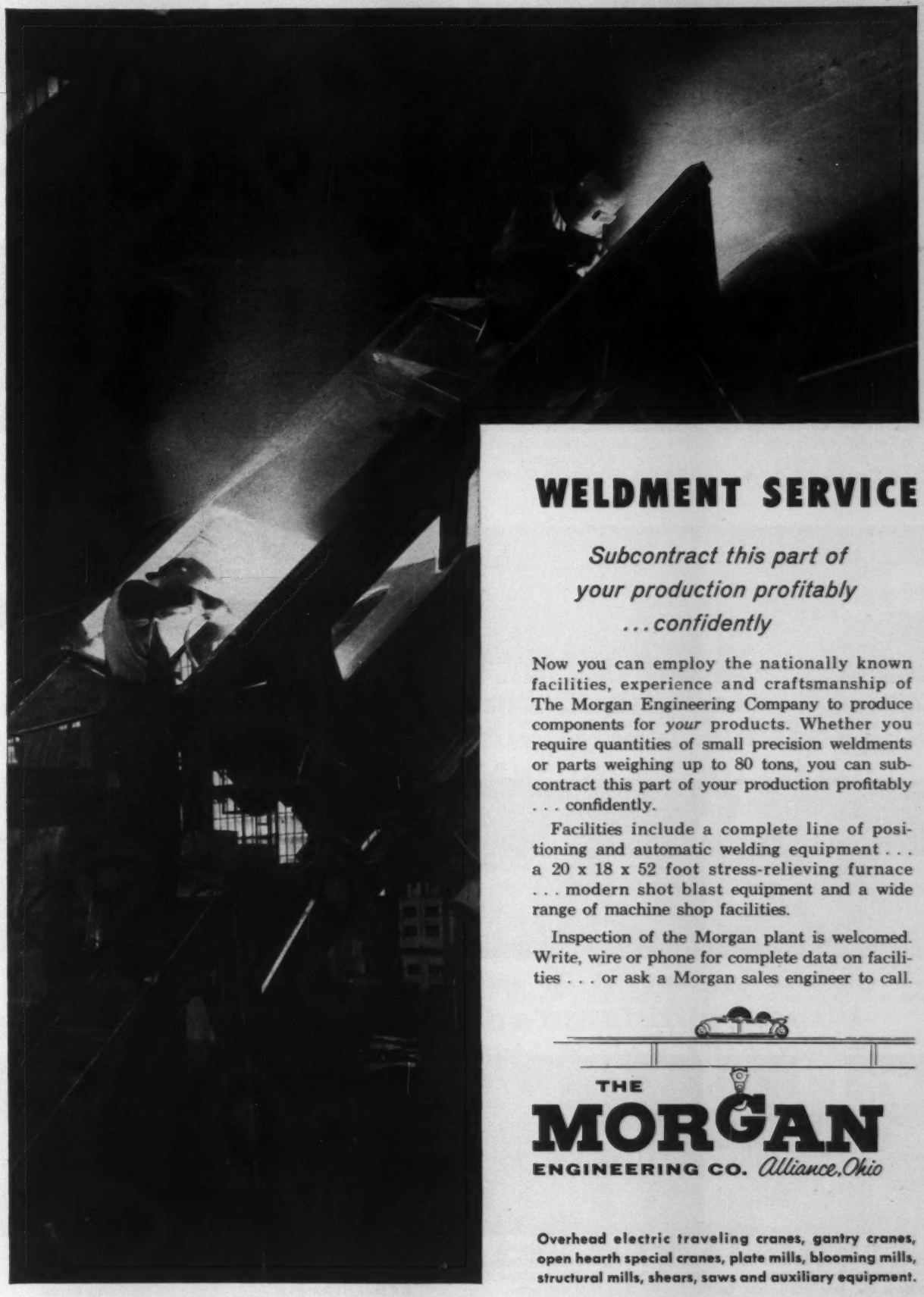
Grant Building • Pittsburgh 30, Pennsylvania

Steel

The STEELMARK on a product tells you it is made of steel. Look for it when you buy.

DISTRICT SALES OFFICES

Atlanta	Cleveland	Detroit	Los Angeles	Pittsburgh
Chicago	Dayton	Houston	New York	Tulsa
			Philadelphia	Warren, Ohio



WELDMENT SERVICE

Subcontract this part of your production profitably ...confidently

Now you can employ the nationally known facilities, experience and craftsmanship of The Morgan Engineering Company to produce components for *your* products. Whether you require quantities of small precision weldments or parts weighing up to 80 tons, you can subcontract this part of your production profitably . . . confidently.

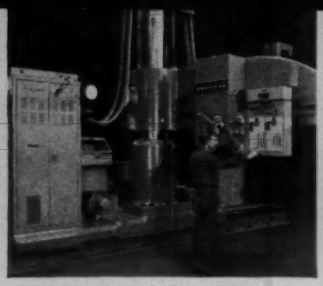
Facilities include a complete line of positioning and automatic welding equipment . . . a 20 x 18 x 52 foot stress-relieving furnace . . . modern shot blast equipment and a wide range of machine shop facilities.

Inspection of the Morgan plant is welcomed. Write, wire or phone for complete data on facilities . . . or ask a Morgan sales engineer to call.

THE
MORGAN
ENGINEERING CO. *Alliance, Ohio*

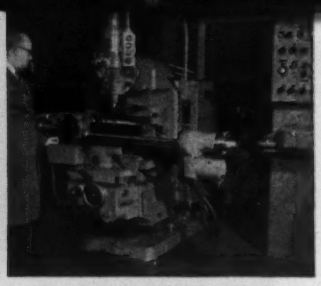
Overhead electric traveling cranes, gantry cranes, open hearth special cranes, plate mills, blooming mills, structural mills, shears, saws and auxiliary equipment.

2509 Engine Lathe
The American Tool Works Company
G-E Mark II Numerical Positioning
Control with Two-Dimension Tracer



Travelling 19-inch Column Openside
Boring and Drilling Machine
The American Tool Works Company
G-E Mark II Numerical
Positioning Control

Turr-e-tape Six-spindle
Turret Drilling Machine with
B&S 15" by 20" Positioning Table
Brown & Sharpe Manufacturing Co.
G-E Mark II NPC



Numericam Cam Milling Machine
Brown & Sharpe Manufacturing Co.
G-E Mark II Numerical
Positioning Control

Burgmaster Eight-spindle
Turret Drilling Machine
Burg Tool Manufacturing Co., Inc.
G-E Mark II Numerical
Positioning Control

Burgmaster Eight-spindle
Turret Drilling Machine
Burg Tool Manufacturing Co., Inc.
G-E Mark II Numerical
Positioning Control

Spindlemaster with Automatic
Tool Changer for Drilling,
Tapping, Boring, and Milling
Cleereman Machine Tool Corporation
G-E Mark III NPC

Edlund-Matic* Drilling and
Tapping Machine
Edlund Mach'y Co. Div., Harsco Corp.
G-E Mark II NPC
*Trade-mark

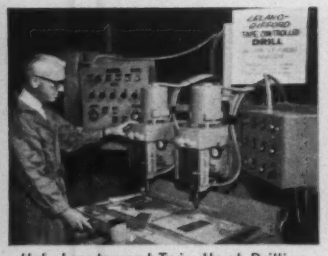
Milwaukee-Matic Model II Drilling,
Milling, and Boring Machine
Kearney and Trecker Corporation
G-E Three-motion Numerical
Positioning Control

Milwaukee-Matic Model II Drilling,
Milling, and Boring Machine
Kearney and Trecker Corporation
G-E Four-motion Numerical
Positioning Control

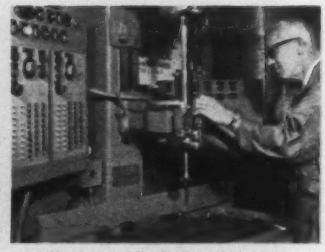
They stole

Vertical Knee-type Milling Machine
Kearney and Trecker Corporation
G-E Mark Century Numerical Control

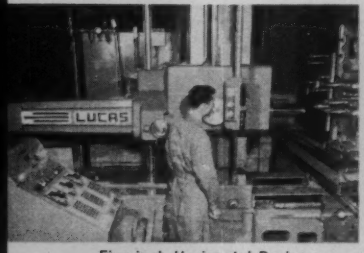
Tape Turn Lathe
The R.K. LeBlond Machine Tool Co.
G-E Mark Century Numerical
Contouring Control



Hole Locator and Twin Head Drilling
Machine for Printed Circuit Boards
Leland-Gifford Company
G-E Mark II NPC



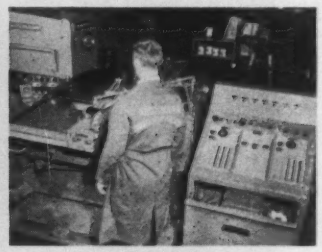
Single-spindle Drilling Machine
Leland-Gifford Company
G-E Mark II Numerical
Positioning Control



Five-inch Horizontal Boring,
Drilling, and Milling Machine with
Automatic Tool Changing
Lucas Mach. Div., New Britain Mach. Co.
G-E Mark III NPC (Numra-tronic)

Five-inch Floor-type Horizontal
Boring, Drilling, and Milling Machine
Lucas Mach. Div., New Britain Mach. Co.
G-E Mark II-M NPC with
Accupin Feedback (Keytronic)

Vertical Spindle Machine with
Automatic Tool Changer
Sundstrand Corporation
G-E Mark III Numerical
Positioning Control

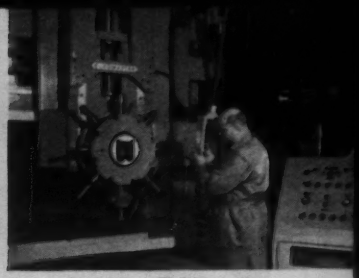


Turret Punch Press
Wiedemann Machine Co.
G-E Mark II Numerical
Positioning Control

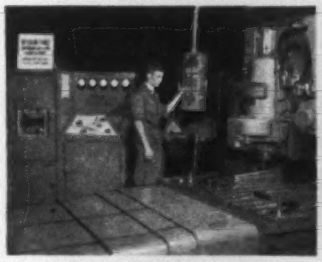
Burgmaster Six-spindle
Turret Drilling Machine
Burg Tool Manufacturing Co., Inc.
G-E Mark III Numerical
Positioning Control

Burgmaster Six-spindle
Turret Drilling Machine
Burg Tool Manufacturing Co., Inc.
G-E Mark II Numerical
Positioning Control

Burgmaster Six-spindle
Turret Drilling Machine
Burg Tool Manufacturing Co., Inc.
G-E Mark II Numerical
Positioning Control



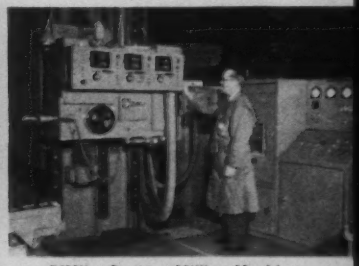
Burgmaster Eight-spindle
Planer-type Turret Drilling Machine
Burg Tool Manufacturing Co., Inc.
G-E Mark II Numerical
Positioning Control



Continuous Path 3-dimension
Profiling and Scribing Machine
Ekstrom, Carlson & Company
G-E Numerical
Contouring Control

Layout Drilling Machine
Fosdick Machine Tool Company
G-E Mark II Numerical
Positioning Control

Fosmatic Turret Drill—32 Spindles
with Automatic Depth Control
Fosdick Machine Tool Company
G-E Mark II Numerical
Positioning Control



DiMil—Contour Milling Machine
Giddings & Lewis Machine Tool Co.
G-E Three-motion Numerical
Contouring Control

the show in Chicago!

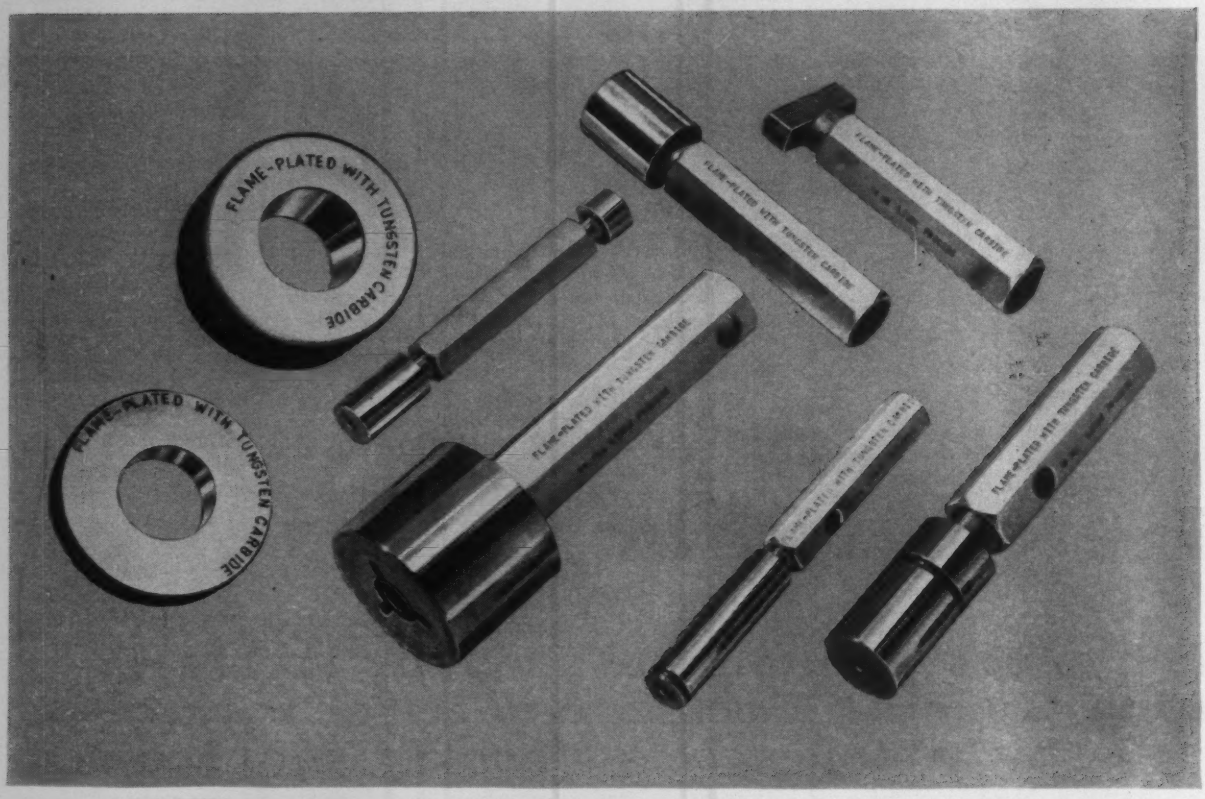
Each of these automatic machine tools—featuring General Electric numerical control—was a "hit" at this year's Machine Tool Exposition. Collectively, they demonstrate metalworking's broad acceptance of automatically controlled machines . . . acceptance that is paying off in increased productivity, greater machine utilization, and elimination of special tooling cost. For complete details on these automatic machines, see the machinery builder or your General Electric Sales Engineer. Specialty Control Dept., Waynesboro, Va.

795-12A

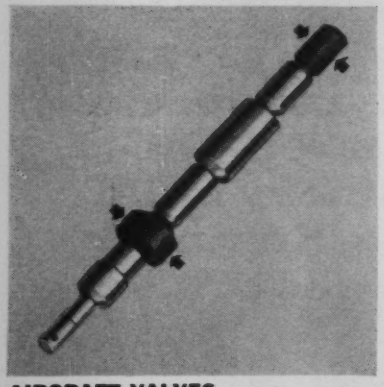
Progress Is Our Most Important Product

GENERAL ELECTRIC

PRECISION PARTS GET TODAY'S LINDE's FLAME-



GAGES—Superior wear resistance and other unique cost-saving advantages are exhibited by plug, ring, air, and specialty gages treated by LINDE's Flame-Plating. For example, Flame-Plated plug gages outwear solid carbide plug gages 3-to-1, and hard chrome-plated gages 20-to-1.

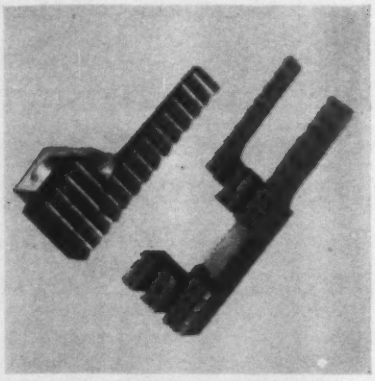


AIRCRAFT VALVES

Bearing surfaces of hot air valves used in the bleed air system of Lockheed's F-104A Starfighter must meet extreme conditions of wear and abrasion, also conditions of high unit loading and temperature extremes. Flame-Plating these surfaces with tungsten carbide solves the problem.

ALUMINUM ROCKER ARMS

One side of the "fin" of this important item in an aircraft engine heater mechanism actuates a lever and is subjected to severe wear. Before Flame-Plating, it lasted from 100 to 300 hours. Coating the wearing surface with tungsten carbide boosted service life to more than 1000 hours.



SEWING MACHINE FEED DOGS

LINDE's Flame-Plating has increased by more than six times the service life of the movable, serrated part that pushes material through the sewing machine. In this application, a .002-in. coating of tungsten carbide in as-coated condition provides both long wear and dependable gripping.

LONGEST SERVICE LIFE with PLATING

Gages and other components achieve remarkable resistance to wear when coated with tungsten carbide and other materials by LINDE's 6,000-degree, supersonic "weld-on" process . . .

NOW—many of the profit-consuming problems of metal wear and machine down-time have been eliminated.

With LINDE's Flame-Plating, gages, spindles, bushings, seals, mandrils, dies, core rods and other precision parts and components retain their precision and close tolerances for the *longest* period of time—under the toughest conditions of abrasion, erosion, corrosion, and high-temperature wear.

LINDE's exclusive service coats base metals with particles of ultra-hard materials, such as tungsten carbide and aluminum oxide—heated to plasticity by 6,000 degrees F. inside the Flame-Plating gun and then successively "fired" at 2,500 fps at the "target area."

The result is a tenacious, "welded-on" coating of approximately 125 microinches rms, which can be finished to the desired microinches rms.

NO WARPAGE—NO METALLURGICAL CHANGES

Despite the 6,000-degree temperature within the Flame-Plating gun, the temperature of the precision part or product being coated remains below 250 degrees F. This feature eliminates distortion and changes in the properties of base metals. Other features include low coefficient of friction and porosity of less than 1 per cent.

Wherever *continuing* precision and *optimum* wear are important factors, LINDE's revolutionary Flame-Plating gives amazingly longer service life . . . reduces production rejects . . . increases salvage value.

Find out how this coating service offered by the Linde Company can save on operating costs, make a good product even better, and improve over-all reliability. LINDE will provide a complete engineering analysis. List your possible applications in the coupon on the right and mail today for complete information.

TYPICAL FLAME-PLATING APPLICATIONS

BEARINGS – sleeve, roller, gas
BLADES – aircraft turbine; doctor blades for papermaking
BLOCKS – anvil
BUSHINGS – ball piston pump
CHUCKS – seaming
CUTLERY – household
CUTTING, INDUSTRIAL – rubber, plastic, skiving knives, foods, paper, slitter knives, chipper knives, discontinuous chip-abrasive materials
DIES, TOOLING – cold-forming; coring punches, core rods, sizing punches, capstans
DOGS – sewing machine feed; gripping dogs
DRILLS – paper, acoustical tile, twist
GAGES – plug, ring, air
GUIDES – wire, textile, machine
HYDRAULICS – pistons, liners, valve plates, wobble plates, metering valves, servo valves, slippers
MANDRILS – wire-forming
PARTS – sintered
PISTON RINGS
PLATES – valve, wear
SEALS – turbine engine, pump
SURGICAL – needle holders and shears
VALVES – aircraft

I-113

Linde Company, Flame-Plating
270 Park Avenue
New York 17, New York

I am interested in Flame-Plating for the following application(s):

_____

_____

_____

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

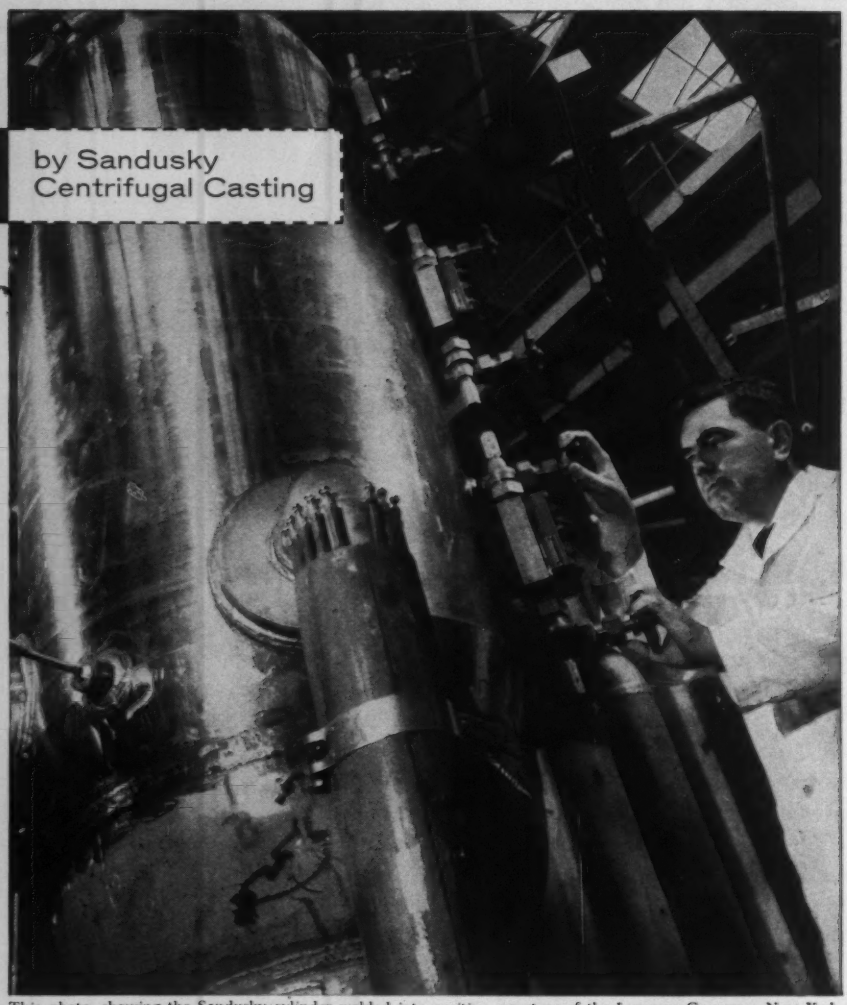
CITY_____ ZONE____ STATE_____

LINDE COMPANY
Division of Union Carbide Corporation

UNION CARBIDE

LINDE and UNION CARBIDE are trade-marks of Union Carbide Corporation.

SOLVED: by Sandusky Centrifugal Casting



This photo, showing the Sandusky cylinder welded into position, courtesy of the Lummus Company, New York. New York who fabricated, assembled and tested the completed loop before shipping it to the ETR site in Idaho.

Nuclear Test Loop Uses Sandusky Centrifugal Casting as Pressurizer Cylinder

A Sandusky Centrifugal Casting is the main cylindrical component of an electrically heated pressurizer, designed by Knolls Atomic Power Laboratory to Section VIII, of the ASME Code (Unfired Pressure Vessels) for use in the new Engineering Test Reactor facilities at Idaho Falls, Idaho.

This 66¼" long cylinder, 27" O.D. with walls 2½" thick, was centrifugally cast of an 18-8 stainless steel (SA-351, Grade CF-8) for the extra corrosion resistance required under nuclear loop service conditions: demineralized water at temperatures to 650°F and pressures to 2500 PSI.

O. G. Kelley Co., Boston, to whom we delivered this 2-ton, fully machined cylinder, welded on the forged heads and nozzles, radiographed the welds, and hydro tested the completed vessel to 4300 PSI.

This is another example of the adaptability of Sandusky Centrifugal Castings to applications demanding the highest order of quality. They may well offer you a practical and economical answer to your cylindrical needs, also.

We are producing cylinders and piping in diameters from 7" to 54"—in lengths to 33 ft.—in a wide range of ferrous and non-ferrous alloys. Write for Bulletin 300, for more complete technical information on the Sandusky process and product application data.

SANDUSKY CENTRIFUGAL CASTINGS
FOUNDRY & MACHINE CO.

SANDUSKY, OHIO—Stainless, Carbon, Low-Alloy Steels—Full Range Copper-Base, Nickel-Base Alloys

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Model 87 20" Metal Cutting Band Saw

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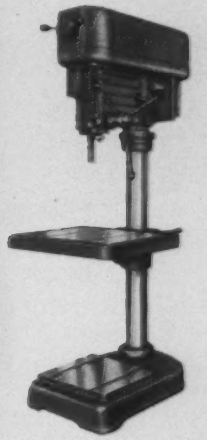
Extra safe, too . . . completely guarded except cutting edge . . . guide arm is counter-balanced.

Model 1200 20" Drill Press



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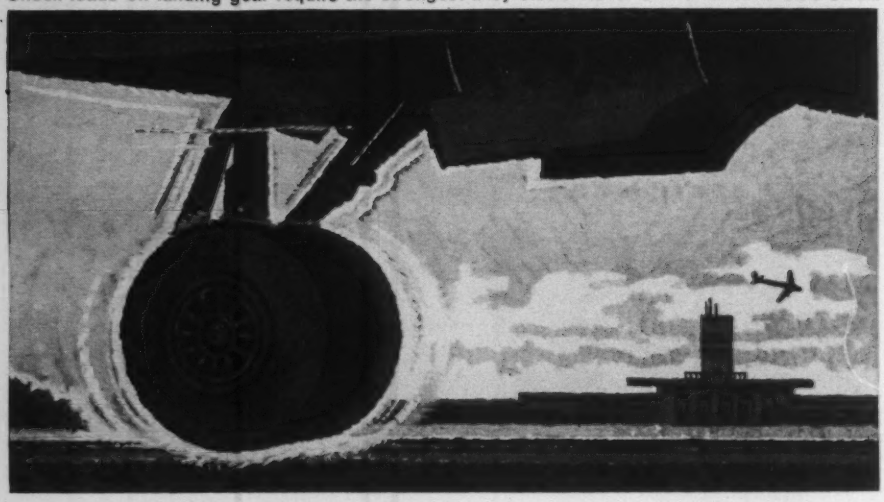
Shock loads on landing gear require the strongest alloy steels made. One of these is USS Strux.



Impact resistance

The ability to take impact is a prime requisite for airplane landing gear parts. And when it comes to taking blows, alloy steel forgings are the champs. Pound for pound, these forgings provide much greater strength than any other material or method of forming.

The maker of the alloy steel forgings shown here says, "The lighter weight made possible by forging parts used in assemblies decreases the weight of the aircraft and increases its payload capacity . . . and at the same time maximum performance of vital parts is assured. This means not only economies in service, but safety and savings during the length of service."

Alloys or carbon steels. While most airplane forgings are made of alloy steel, many industrial forgings are made of carbon steel. Both types of steel in a variety of compositions are produced by United States Steel.

To assure uniform high quality. U. S. Steel carefully controls all processes from the steel melting to the final inspection. That's because the quality of the final forging is a reflection of the quality of the steel from which it was produced.

Metallurgical service. Service Metallurgists are available for prompt consultation on any metallurgical problem in all of U. S. Steel's district sales offices.

For more information, call your nearest district sales office or write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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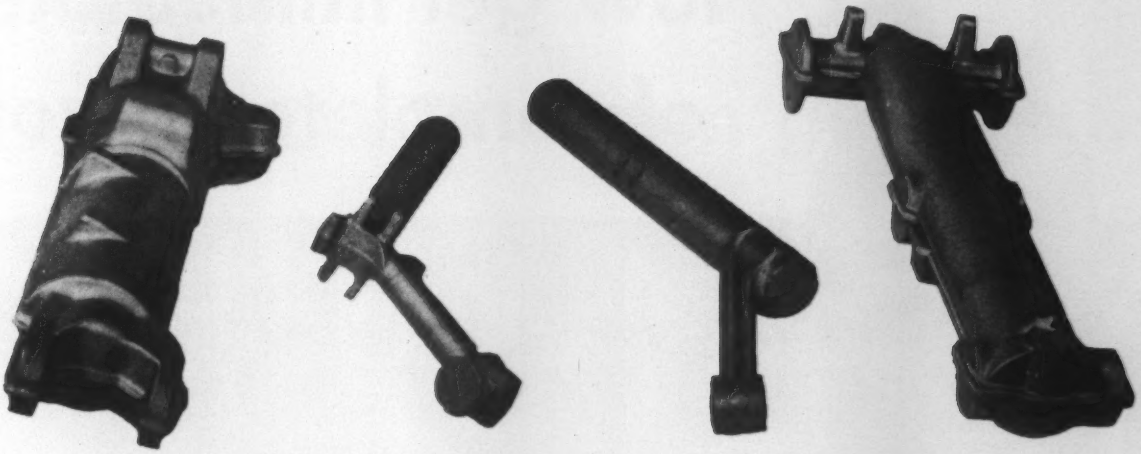
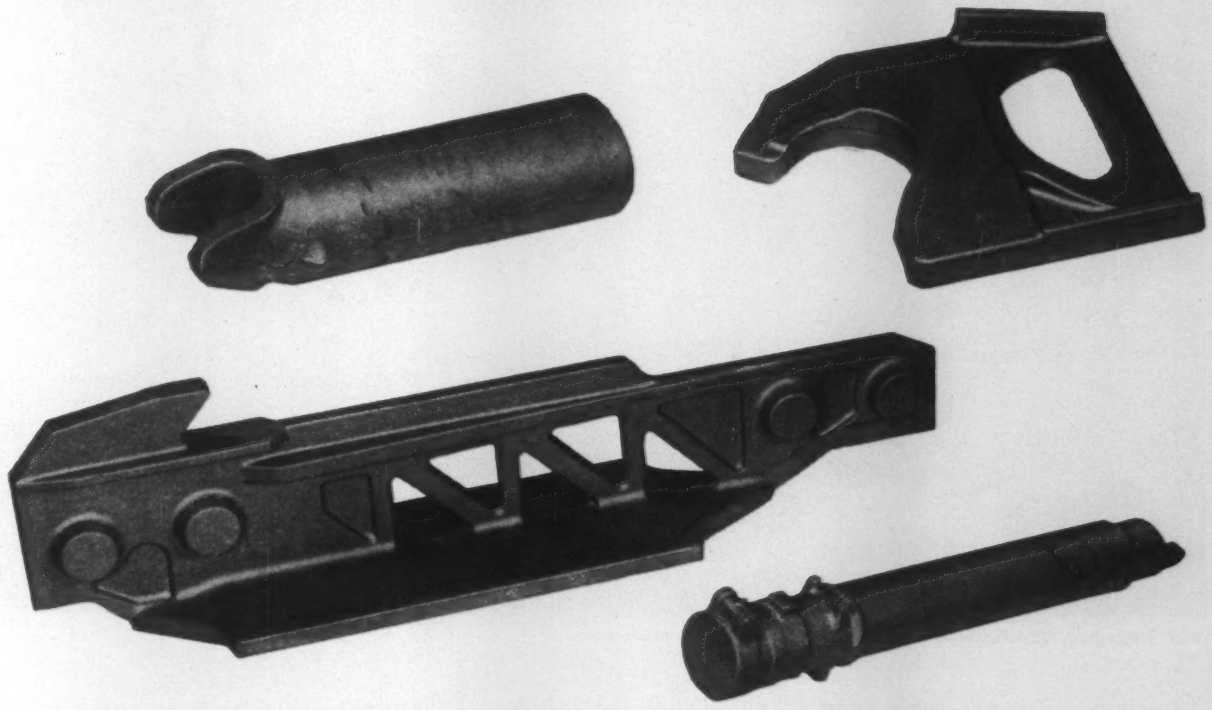
...because it's strong
...because it's tough



steel forgings have it!



Aircraft forgings made from USS CARILLOY Alloy Steels offer maximum strength with least weight. These include landing gear cylinders, pistons and other critical parts.

When it's a vital part, forge it from steel. FORGED

"Now get immediate of complete line of

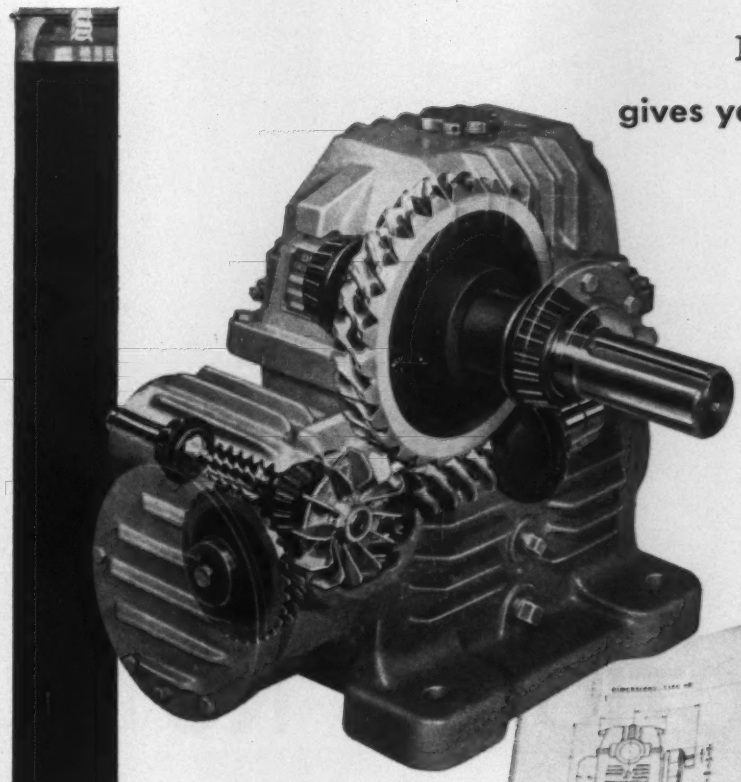
A. T. Gallagher, Manufacturing Superintendent, Delroyd Worm Gearing.

"Here's a shot of our Delroyd Verso worm gear — one of hundreds being boxed and made ready for shipment. Unlike most speed reducers, this Verso unit can be mounted in any position — horizontal, vertical, upside down. • "This is but one model in a complete line of Delroyd worm gear reducers — with the widest range of horsepowers and sizes in the industry."*

*1⅛" center distance, fractional horsepowers — to 12" center distance, 152 horsepower. Reducers to 36" center distance with horsepower capacities to 700 are supplied as standard. Larger units to meet any requirement can be supplied on special orders.

delivery

DELROYD worm gearing..."



DELROYD worm gearing
gives you these superior design features:

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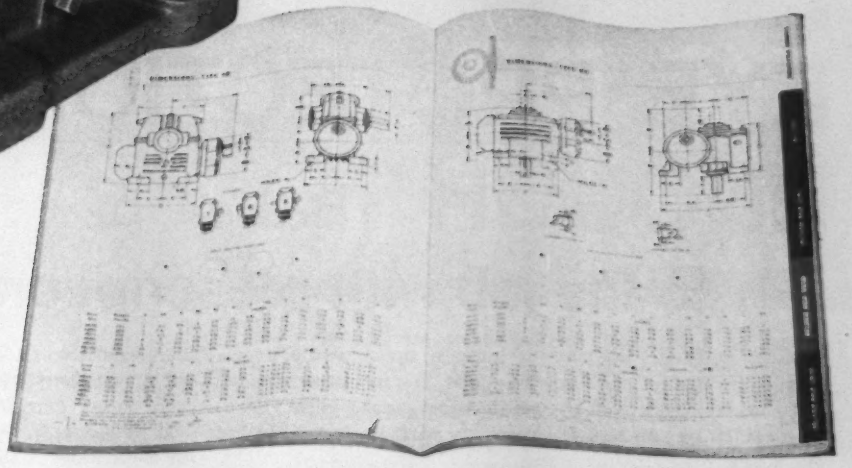
- Centrifugally cast bronze gear for increased mechanical ratings
- Fan cooled finned housings for higher thermal ratings
- Lower weight per horsepower
- More horsepower per dollar



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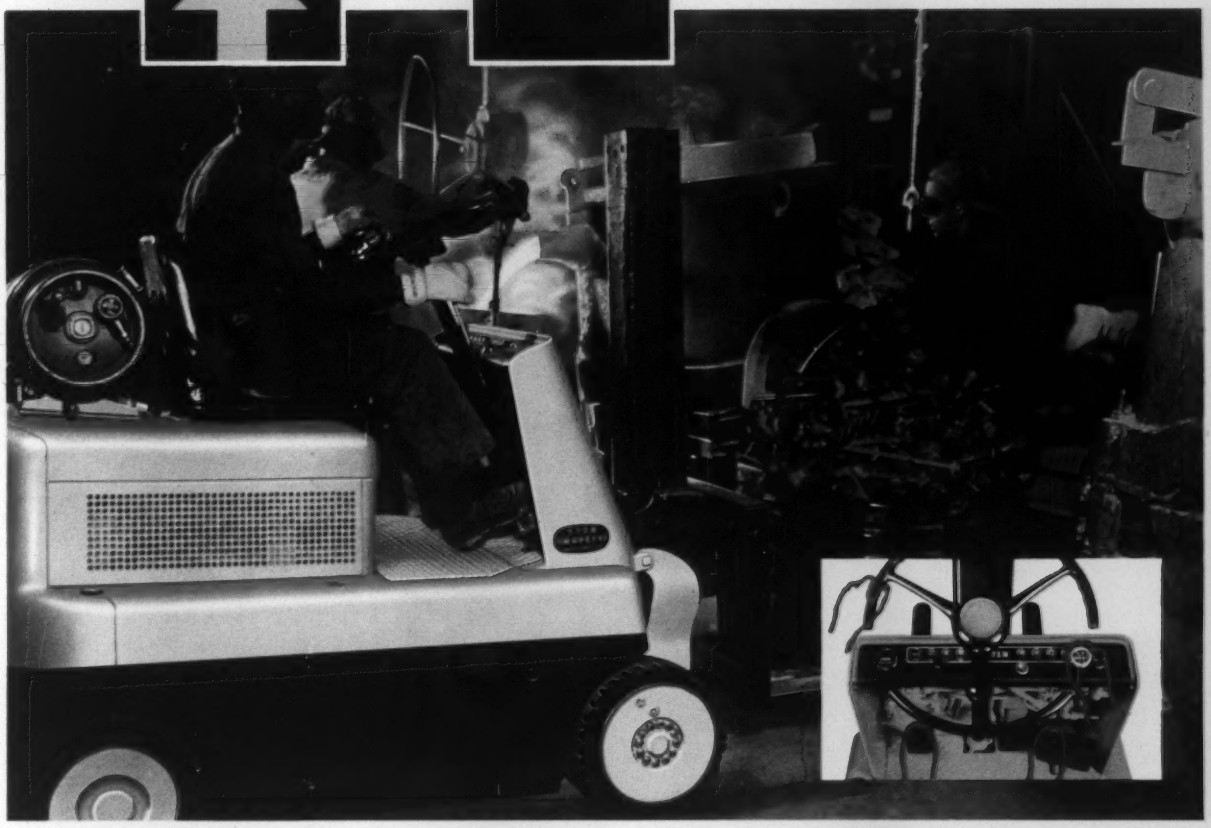

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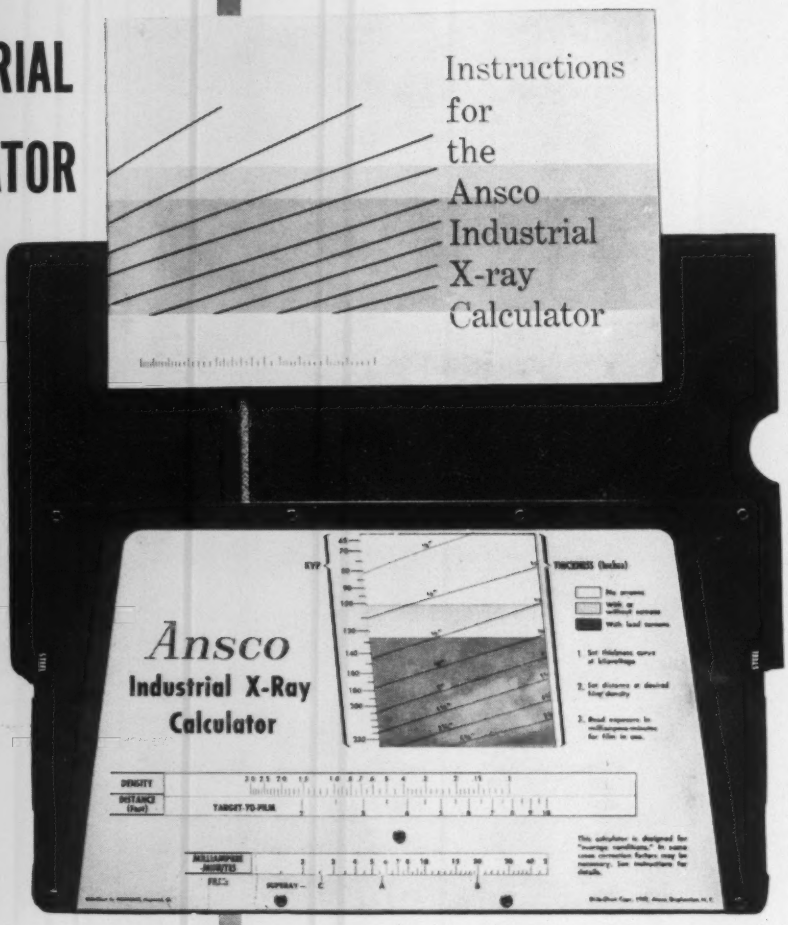

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Cost-conscious Engineering

This eight-strand continuous casting plant* for producing standard steels has been in full operation at the Terni steelworks in Italy since 1958. A plant built for S.A.F.E. Hagondange in France is a fine example of such an installation for continuous casting of alloyed steels. Further plants for the production of concast billets and slabs are being planned for foreign and domestic customers.

*designed and built by DEMAG according to the Junghans system in co-operation with Mannesmann AG and Gebrüder Böhler & Co

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US-Representatives: American DEMAG Corporation, One Gateway Center, Pittsburgh 22, Pa

Mr. S. E. Miller, Vice President and Division Manager of American Bosch Arma, shows the hundreds of items which go into the manufacture of a fuel injection pump (upper left of table).

IBM MOS

MANAGEMENT OPERATING SYSTEM SAVES AMERICAN BOSCH $120,000 YEARLY ON SHOP ORDERS ALONE

...TRIPLED SAVINGS ANTICIPATED WHEN SYSTEM IS EXPANDED!

American Bosch has turned to IBM's new systems techniques for faster, more sensitive control of its manufacturing cycle at the Springfield, Massachusetts, plant. Utilizing the IBM Ramac 305, the Management Operating System has been applied to Materials Planning and Inventory Management, and large savings have already accrued.

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MOS can be applied to most industrial operations, with specially trained manufacturing representatives to assist you. IBM Balanced Data Processing provides comprehensive support in applying the system to your company's operation. For full information, call your nearest IBM office.

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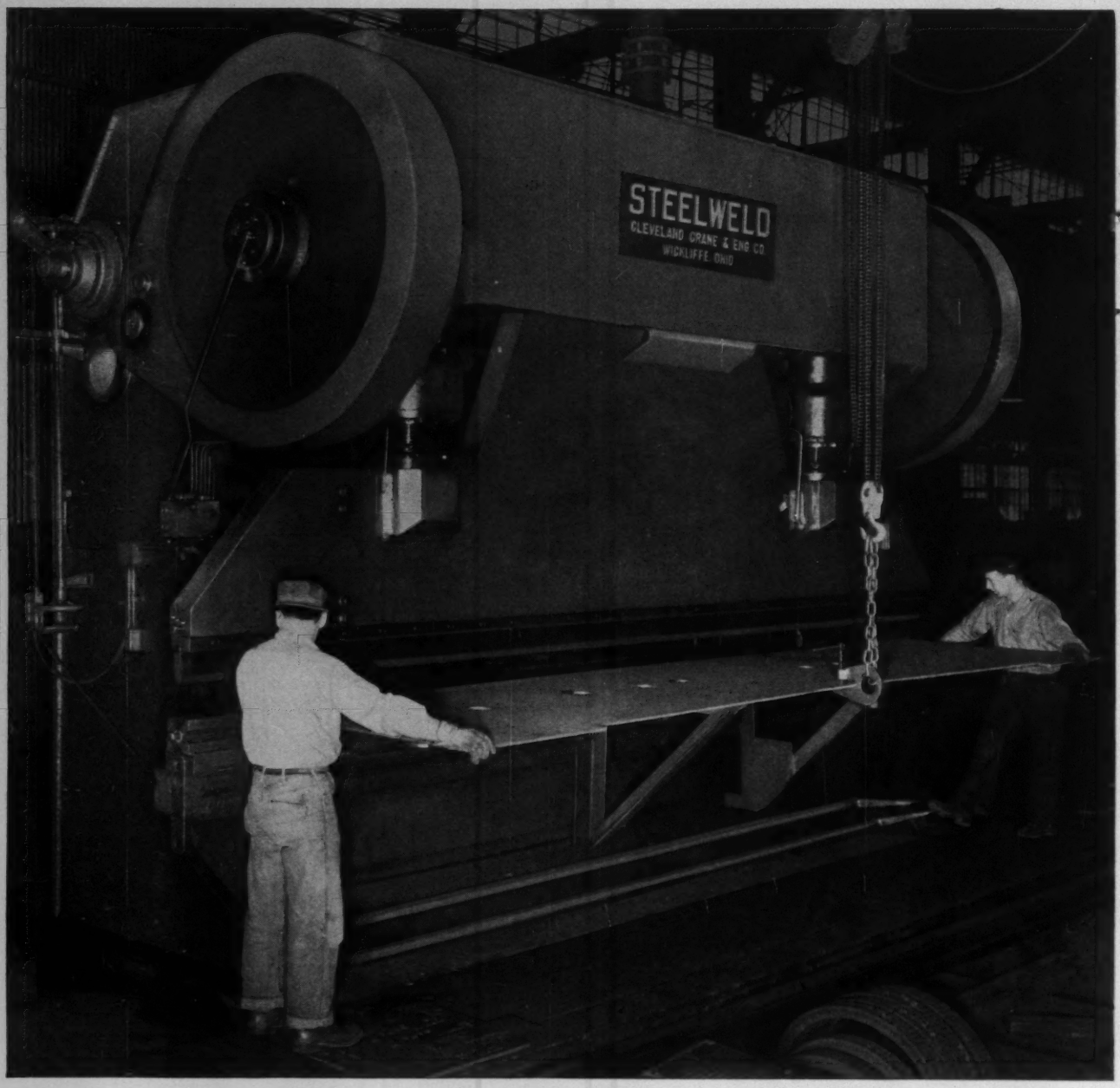

Reversing Ram Makes Die Changes Easy

This ruggedly built press is an operator's delight. It is provided with a reversing ram drive which permits backing the ram or upper die away from the work at any point in the stroke.

Since parts are produced in small quantities on this press, the dies and machine settings usually must be changed many times during a day. The reversing ram and other fine features make this work easy and fast for the operators.

This press is rated at ½" x 14'-0" mild steel but will bend plate to 18'-6" long that can clear the 18" deep throat.

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Operators in hundreds of plants all over the country have acclaimed the ease of operation of Steelweld Shears. They like them because they have features that ease their work and make for accuracy. Steelweld is the **only** pivoted-blade shear on the market. No other shear has the wonderful MICRO-SET knife adjustment. Every Steelweld Shear is provided with fatigue-reducing electric foot switch control as standard equipment.

This shear is rated at 10' x 1".

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- Bending Presses
- Single-Point Presses
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Single and double action types

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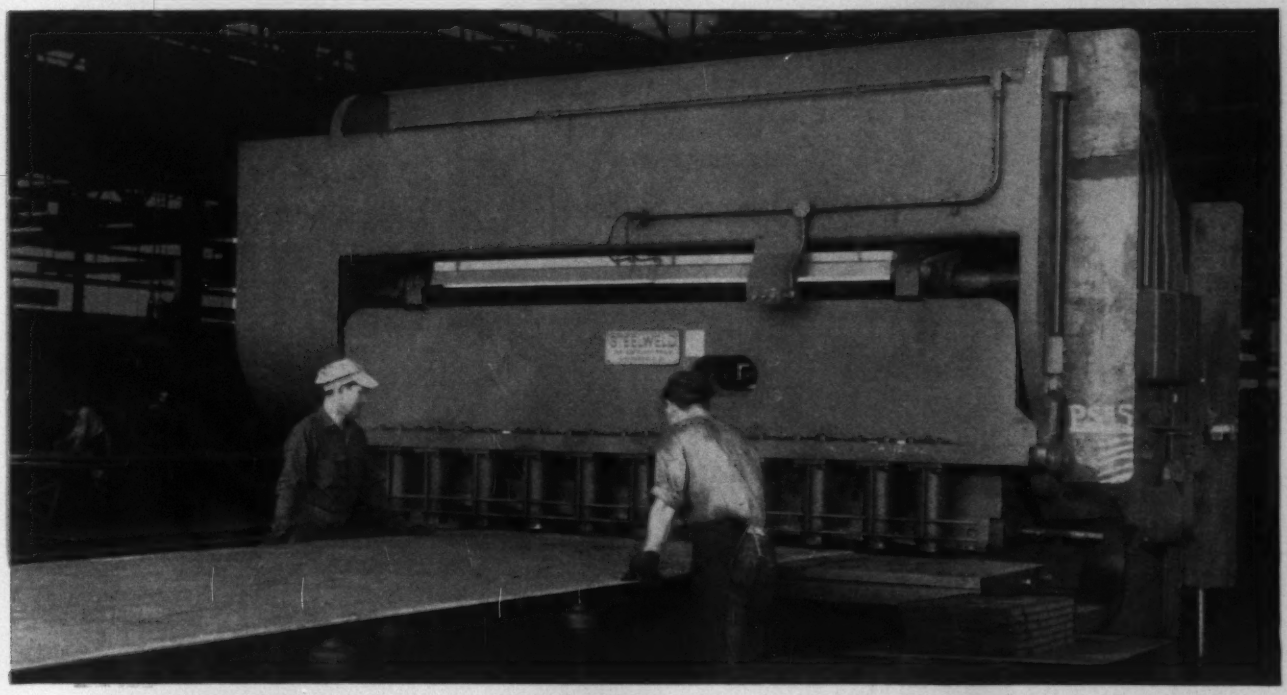

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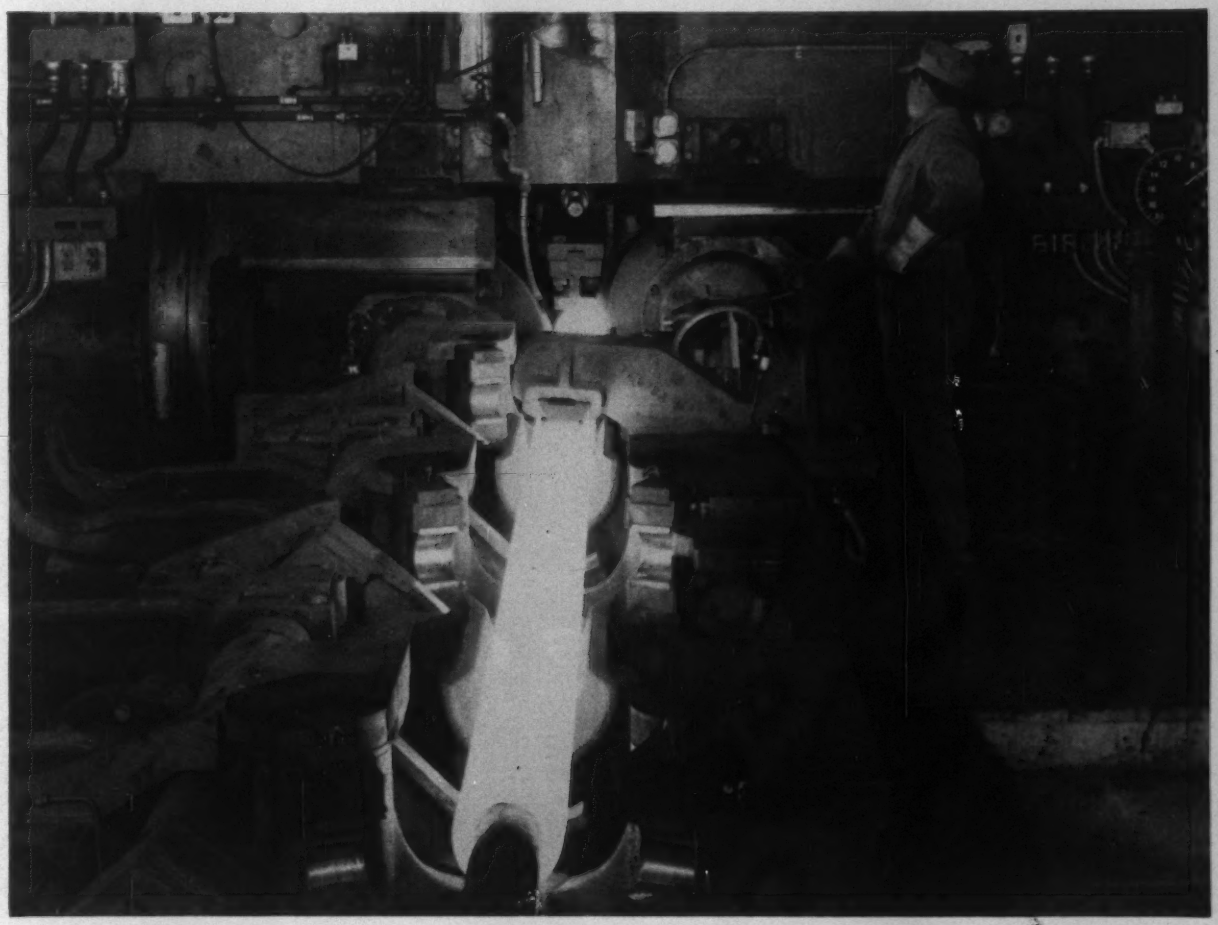

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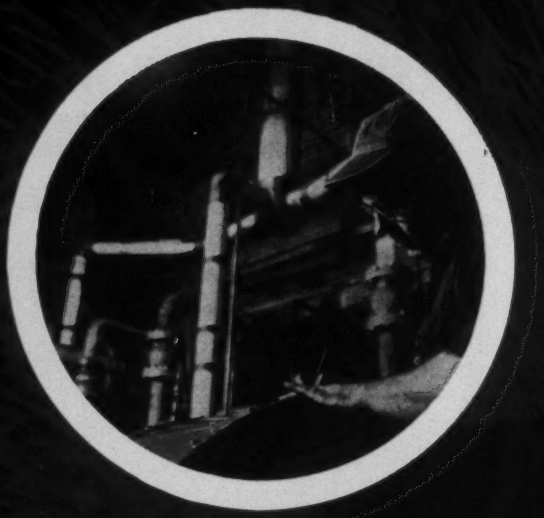
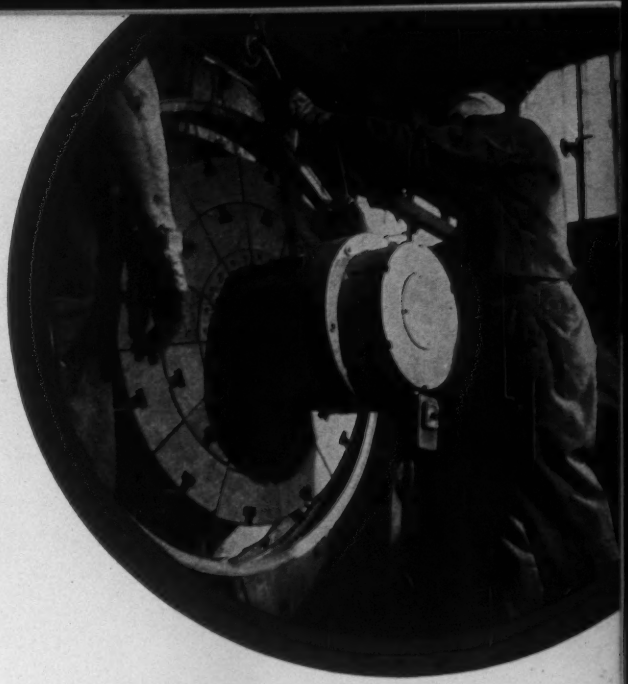
TIMKEN®
***Fine Alloy* STEEL**



Amweld rings up $14,621

On 8 ring-sizing machines Amweld was experiencing hydraulic difficulties similar to those in the butt welding units. Oil deposits, sticking valves, pump failures, etc. were common problems. 1040 maintenance man-hours a year were required to keep the equipment operating. But again the introduction of a Mobil hydraulic oil and preventive maintenance procedures slashed this labor cost, saved Amweld $2,005 the first year.



On three of Amweld's expander units, brass wear plates on the expanding mandrel were undergoing serious wear. Frequent replacement of these plates, with attendant labor costs, meant a $3,936 expenditure for Amweld in one year alone. Studying the problem, Mobil Engineers recommended an extreme pressure grease. In the year since this Mobil product was introduced, not a single replacement has been made.

savings with Mobil!

A leading producer of welded rings, American Welding & Manufacturing Co. cuts maintenance costs with Mobil Lubricants and engineering service.

Specializing in the production of welded rings, bands and assemblies, American Welding has developed methods and techniques for precision-welding alloy steels and non-ferrous materials in both light gauges and heavy sections. Parts are supplied "as-welded," or machined and finished, to prime contractors, and include components for jet engines and missiles.

Critical tolerance requirements demand rigid maintenance procedures at Amweld. And Mobil products and engineering service have made significant contributions in terms of minimized machine downtime and consistent savings in lubricant and parts costs. Working in close cooperation with Amweld technical personnel, Mobil has made recommendations that have saved this producer $14,621.

Mobil's extensive background in lubrication may help you achieve similar savings in your plant. Your Mobil Representative is the man who can tell you.

Mobil

CORRECT LUBRICATION

MOBIL OIL COMPANY, 150 E. 42nd St., New York 17, N.Y.

DOW
SOLVENTS

ANNOUNCING...

Chlorothene NU

New stabilizer system solves corrosion problems—makes recovery easy!

Newly developed Chlorothene® NU combines high solvency and safety with an advanced stabilizer system that makes possible an extraordinary range of cold-cleaning applications – makes recovery easy, too!

The exceptional stability of Chlorothene NU (specially inhibited 1,1,1-trichloroethane) practically eliminates corrosion of sensitive metals. You can use it for cleaning aluminum, zinc, and white-metal alloys–as well as other metals, many plastics, rubber products and other materials.

Because increased stability makes recovery easy and practical, you can enjoy the economy of using Chlorothene NU over and over again. In most cases, existing equipment, such as a trichloroethylene still, does an excellent job.

Safe two ways! Low in toxicity, Chlorothene NU has a maximum allowable vapor concentration of 500 parts per million. That's closely comparable to many flammable solvents and is substantially more favorable than most chlorinated solvents. In addition, Chlorothene NU has no fire or flash point, as measured by standard methods. These features not only make Chlorothene NU safer to use–they simplify new cleaning systems and waste disposal.

COLOR CODED–For easy identification, even from 100 feet away, drums of Chlorothene NU are distinctively color-coded in green and white. For more information about Chlorothene NU, call your distributor of Dow solvents. He knows all about its use, recovery and comparative cost. Or contact your nearest Dow sales office.

THE RIGHT SOLVENT FOR THOUSANDS OF INDUSTRIAL USES. Not only is Chlorothene NU recommended for cold-cleaning dip operations on the production line—it also cleans by spray, bucket or wipe methods. It's an all-purpose solvent for many applications, both on the production line and for maintenance use.

SEE YOUR DISTRIBUTOR OF DOW SOLVENTS FIRST!

The widest line of industrial solvents: Trichloroethylene, Perchloroethylene, Methylene Chloride, Chlorothene NU.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN DOW

See "The Dow Hour of Great Mysteries" on TV.

You know steel is low in cost. How can you *keep* it that way? One way is never to forget that there's more to *final* cost than initial price. Hidden—and unnecessary—costs of possession, like handling, storing, cutting, taxes and insurance often creep in. Recognize these added expenses.

Each steel user's case is different. Your steel service center will be glad to help you determine the most economical way to buy steel. Figure all your costs of possession, such as:

Cost of capital:	Cost of operation:	Other costs:
Inventory	Space	Obsolescence
Space	Materials handling	Insurance
Equipment	Cutting & burning	Taxes
	Scrap & wastage	Accounting

Call your nearby steel service center, or write for free booklet, "What's Your Real Cost of Possession for Steel?"

STEEL SERVICE CENTER INSTITUTE

. . . YOUR STEEL SERVICE CENTER

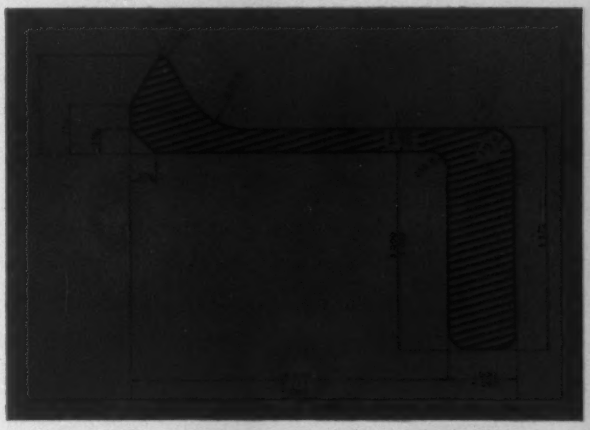
STEEL SERVICE CENTER INSTITUTE
540-A Terminal Tower, Cleveland 13, Ohio

CONNORS special sections at Yale...

"We've had quality at cost savings ever since we pioneered with Connors Special Sections," says Mr. R. G. Ochsner, Director of Materials, Yale Materials Handling Division, The Yale & Towne Manufacturing Company.

"Fifteen years ago Connors came to us with a new process of hot rolling special sections for our industrial lift trucks masts," says Mr. Ochsner. "The Connors' Special Sections not only met our stringent specifications of strength and tolerances but provided a cost reduction over the cold drawn sections we had been buying.

"In addition, we found that the Connors Mill has the flexibility to handle the varied mast requirements our complete lift truck line demands. We could order the quantities we wanted thus avoiding excessively large inventories."



Yale's Design Engineers were concerned with possible bucking of the web in the channel of their largest truck mast assembly. Connors furnished two half sections to be continuously welded in the center. The knob furnished sufficient surface to insure a perfect weld and acted as a stiffening rib without the necessity of wasting steel where it is not needed.

Connors engineers can give you real help in the use of special sections.

For illustrated brochure or consultation
Write or call Connors — Specialists in Special Sections

CONNORS STEEL DIVISION, P. O. BOX 118C
HUNTINGTON, W. VA. • PHONE JAckson 9-7171

CONNORS STEEL DIVISION **PORTER** ***H.K. PORTER COMPANY, INC.***

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

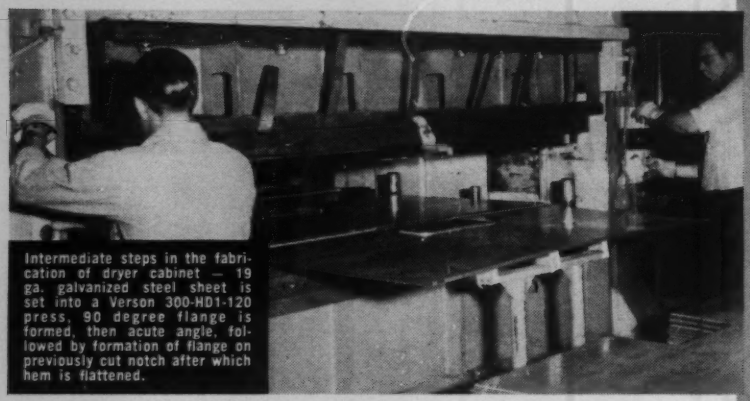
ZINC COATED STEEL

Is The Proven Answer To These

Corrosion Resistance + Formability Make Continuous Galvanized Sheet The *Most Practical Material* For Both Painted and Unpainted Washer and Dryer Parts.

MAYTAG protects product quality and profits by using 15,000 tons of continuously galvanized steel per year for washer and dryer parts.

After extensive tests, Maytag engineers decided that galvanized steel gave them the most practical combination of strength, excellent corrosion resistance and ductility for low cost fabrication. This zinc-coated material is used on both painted and unpainted parts to provide lasting protection against the combined corrosive effects of water, heat, humidity, soaps, detergents, bleaches, abrasion and aeration.

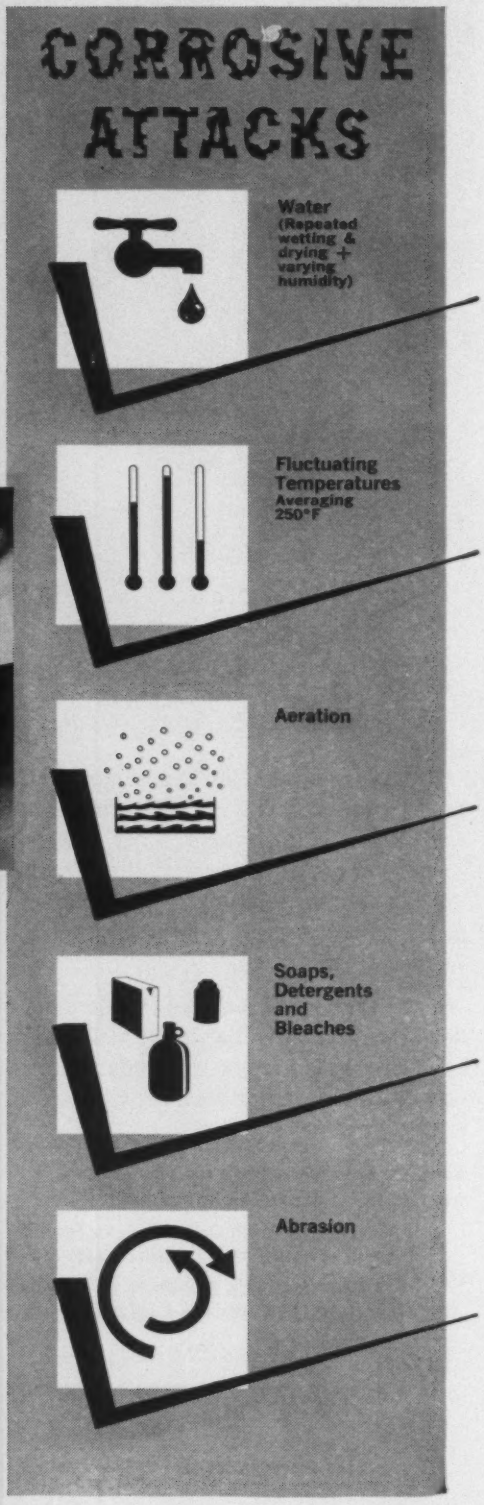


Intermediate steps in the fabrication of dryer cabinet — 19 ga. galvanized steel sheet is set into a Verson 300-HD1-120 press. 90 degree flange is formed, then acute angle, followed by formation of flange on previously cut notch after which hem is flattened.

The tenacious, protective zinc coat remains unimpaired, adhering to the base metal through deep drawing, bending, rolling, seaming, stamping and other operations.

This combination of properties is responsible for the recent development of a wider use of galvanized steel in the automotive industry. Critical corrosion problems in vital parts of the new unitized automotive members have been solved by the use of continuously zinc coated steel.

St. Joseph Lead Co. supplies zinc "electronically-matched" to the individual specifications of continuous line galvanizers.



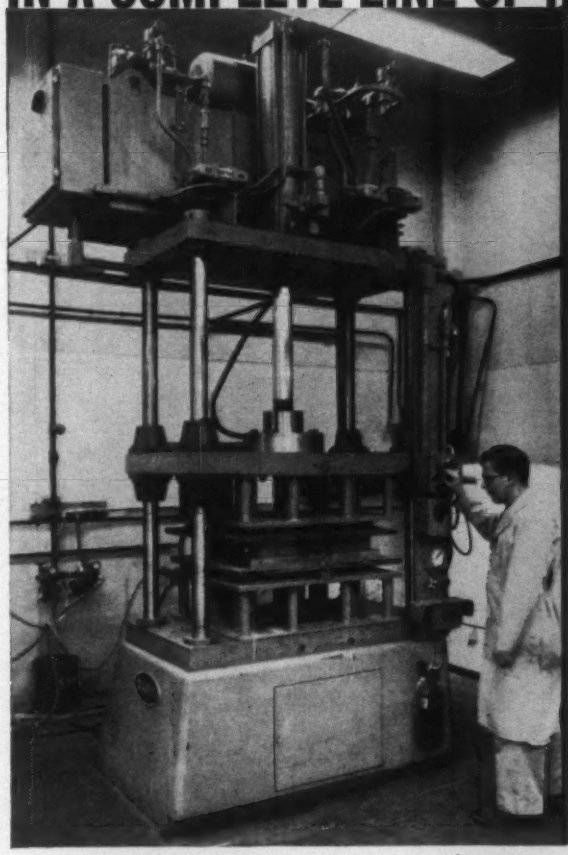
ST. JOSEPH LEAD CO.

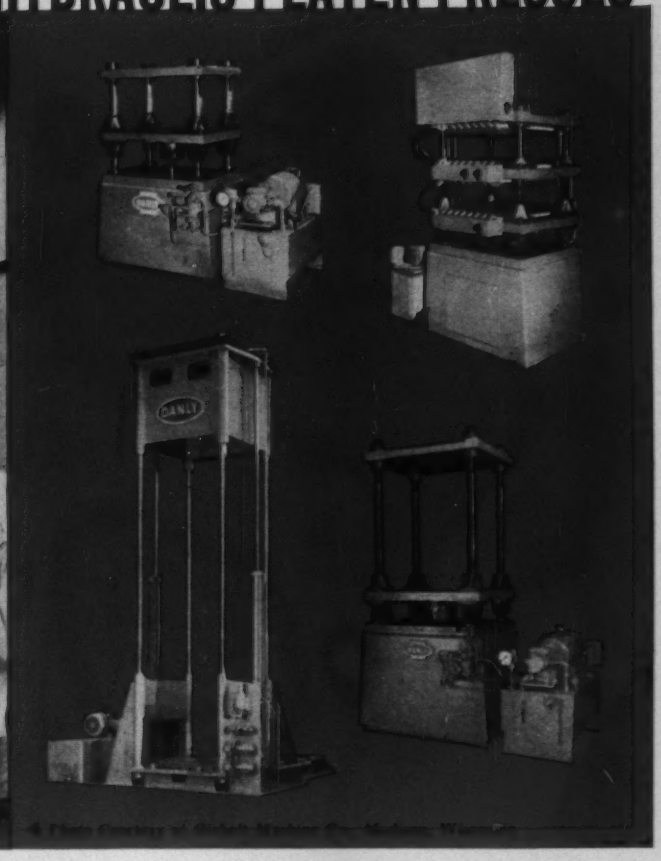
ST. JOE

250 Park Avenue, New York 17, N. Y.

ZN-169

GET DEPENDABLE DANLY PERFORMANCE IN A COMPLETE LINE OF HYDRAULIC PLATEN PRESSES

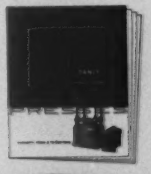




Danly Hydraulic Platen Presses offer you the extra precision and brawn for which Danly equipment is known throughout industry. Danly presses are engineered to the highest machine-tool standards with design innovations which add the extra measure of performance you want.

You'll find top precision in the long-wearing alloy steel columns, accurately-machined platen faces, and demountable bushings on Danly Platen Presses. Parallelism is held to tolerances equivalent to the finest Danly Precision Die Sets.

Danly Platen Presses are available with one or more moving platens, up-acting or down-acting. Capacities range from 5 to 500 tons. Variations in stroke, speed and pressures are offered as required. Heating elements and other accessories are also available. Your choice of electrical control or lever operation. Whatever you need in a hydraulic platen press you can obtain from Danly. For more complete details and specifications, write for your copy of the new catalog, "Danly Hydraulic Platen Presses."



DANLY

DANLY®

DANLY MACHINE SPECIALTIES, INC., 2100 S. LARAMIE AVE., CHICAGO 50, ILLINOIS

Illustrated above are only a few of the many different sections in the standard range held. In point of fact, almost any practicable shape can be supplied on request.

THOS. W. WARD LTD

Write to Overseas Trade Dept. I. A.
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Cables: Forward, Sheffield

London Office: Brettenham House, Lancaster Place, Strand, W.C.2

Have you received your current copy of The Albion Machinery Catalogue? If not, write for one today. This catalogue contains a comprehensive stock list of all new and secondhand Plant and Machinery, including Machine Tools, Contractors' Plant, Generating Sets and Pumps. It is regularly brought completely up to date and reprinted.

recipe for profit ▶
the
Westinghouse
recipe
for motor controls
Westinghouse

TESTED RECIPES FOR PROFIT . . .

the blending of ingredients in Westinghouse controls meets today's demands for profitable production

Combine advanced design ability and modern manufacturing facilities . . . fold in select materials and quality components. Mix in years of research and experience. Spice as required with superior application and engineering assistance. Baste with outstanding quality control until mixture attains perfection. Garnish with nationwide repair facilities.

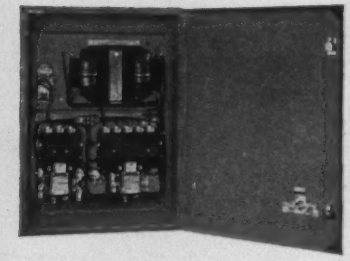
That's the Westinghouse control recipe. But just as a chef's deft touch is the final element needed to turn fine ingredients into an epicurean triumph, so a generous portion of Westinghouse experience and know-how blends superior control ingredients. Result: **more control value for your money** — reserve capacity to handle overloads . . . long, trouble-free service . . . and apparatus performance matched perfectly to your needs. Hidden qualities that distinguish Westinghouse controls . . . and your best insurance against costly down time.

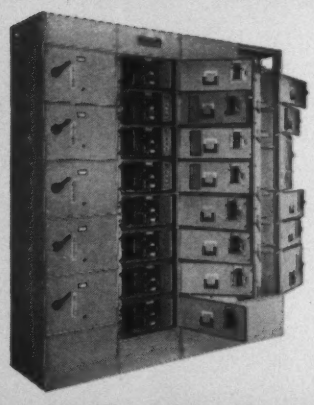
Westinghouse makes a wide range of outstanding industrial motor controls. Ask your local Westinghouse representative to explain all their **hidden values** . . . benefits by the baker's dozen . . . for more profitable plant operations. He'll be glad to assist you in applying Westinghouse controls.

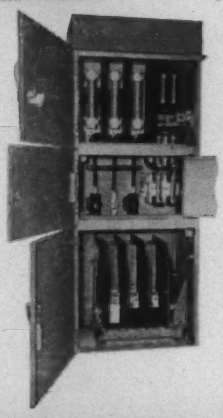
Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

Westinghouse

Just ask any gourmet. Good ingredients alone don't guarantee an epicure's delight. It takes years of experience to convert a basic recipe into a blue ribbon winner. So, too, with superior electrical products.







Ampgard* High-Voltage Starters

Maximum protection for motors, systems and personnel.

Faults interrupted in less than ½ cycle . . . isolates fault to prevent shutdown of other equipment.

Completely front accessible.

Externally operated line isolating switch.

Exclusive mechanical and electrical interlock . . . prevents switch operation under load; automatically stops motor when cabinet is open.

Full line available . . . for squirrel-cage, wound-rotor and synchronous motors up to 3000 hp — up to 5000 volts.

* Trade-Mark

Reduced Voltage Starters

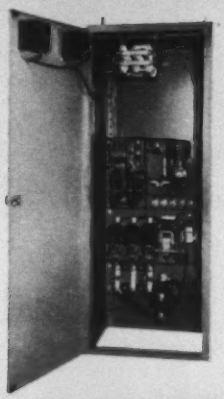
Widest possible selection of primary resistor, auto-transformer, part-winding and star-delta types for squirrel-cage, wound-rotor and synchronous motors in all hp ratings — up to 600 volts.

Manual and magnetic starters to provide the proper starting characteristics for any application.

Available with integral circuit breaker or disconnect switch — fused or non-fused.

Enclosures available for every need . . . general purpose . . . dust-tight industrial . . . watertight . . . explosive atmospheres.

Available for immediate delivery.



Static Slipsyn® Synchronous Motor Control

Static transistor circuit guarantees . . . maximum reliability and accuracy; no moving parts to wear, corrode or fail; unaffected by contaminated atmosphere.

Motor field excitation applied at precise speed and pole position.

Adjustable pull-out protection, permits immediate detection or delays action to eliminate false tripping caused by transients.

Available as complete starter or field conversion unit for **any make** control!

Control Centers

Compact grouping of all motor controls

cuts installation time;

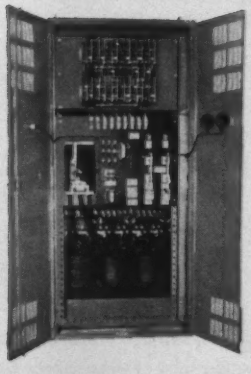
frees production areas;

permits easy one-man control supervision;

speeds maintenance and service.

Interchangeable modular construction.

DESIGN TESTED AND VERIFIED in the Westinghouse HIGH POWER LABORATORY



D-C Packaged Power Supplies

Ideal for cranes, elevators, magnetic chucks, etc.

"Packaged" units, including control, are ideal for "on-the-spot" conversion of a-c to d-c, eliminating long line voltage drops.

Lower first cost, lower installation cost than motor-generator set.

Require approximately 67% less floor space, weigh less than half of equivalent motor-generator set.

Completely static units — essentially maintenance-free.

Hermetically sealed silicon cells prevent contamination of the rectifier; no apparent aging assures years of trouble-free service.

Another example of National Roll quality control

John Patton, National's assistant sales manager and Joe Marsalka, metallurgist, look over the reflectoscope "profile" of a steel roll.

No flaw escapes this electronic eye!

Your steel rolls from National are given a thorough examination by reflectoscope before shipment. Ultra-high frequency sound waves traverse every segment of the roll, electronically assuring the absence of internal flaws which might shorten the roll's service life in your stand.

This attention to detail and emphasis on high quality of product are two reasons why more and more steel makers are turning to National for their steel, iron and nodular iron rolls. From the moment you call a National representative, your roll problem gets the *personalized* attention of men experienced in analysis, design and production.

We'd like to tell you more about how National Roll's expanded staff and facilities can serve you. Next best thing to a visit with us is a look at our new brochure. May we send you a copy? It helps explain why . . .

National's the growing name in rolls

NATIONAL ROLL & FOUNDRY DIVISION

GENERAL STEEL CASTINGS CORPORATION, Avonmore (Westmoreland County), Pa.

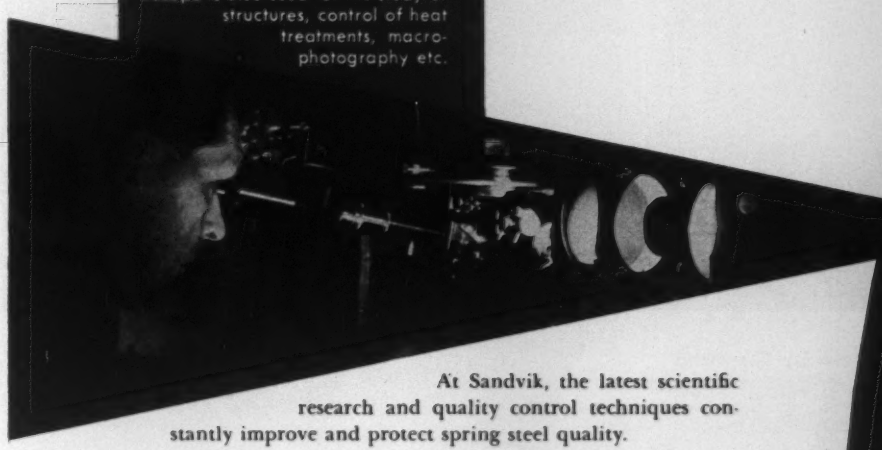
General Steel Castings Corporation, General Offices: Granite City, Illinois • Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.

SANDVIK

Keeps A *Scientific* Eye On

SPRING STEEL QUALITY

Control of steel purity. The SANDVIK laboratories carry out more than 200,000 chemical analyses a year.



Research microscope for up to 2,000X enlargements. This microscope is also used for the study of structures, control of heat treatments, macrophotography etc.

At Sandvik, the latest scientific research and quality control techniques constantly improve and protect spring steel quality.

This is part of the reason why Sandvik steels have the special physical stamina to give consistent performance in such critical applications as flapper valves, instrument springs, shock absorbers, surgical instruments, unbreakable watch mainsprings, piston ring segments and expanders, etc.

Sandvik stocks a wide variety of grades and sizes of cold rolled specialty strip steels. For information on leading types, send for this free brochure.

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SWarthmore 7-6200 • N.Y.C. ALgonquin 5-2200
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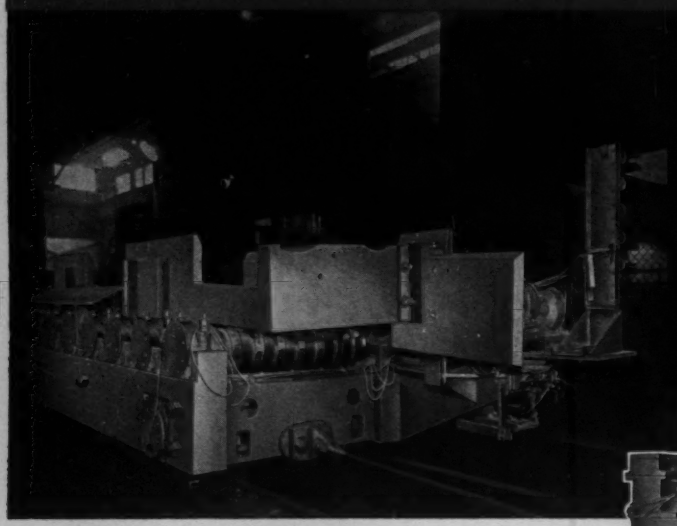
Works: Sandviken, Sweden

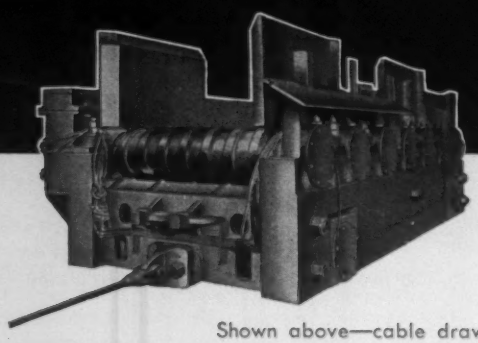
99-121

TREADWELL

cable-drawn **table-top INGOT CARS handling two 15-ton ingots... at a speed of 800 ft. *per minute***



Treadwell engineering was called on to develop the speed and efficiency needed for handling heavy ingots at high rates of speed. This ingot car has table rollers that are carried by anti-friction bearings and the axles are anti-friction bearing mounted. Write to Treadwell for any information on ingot cars.



Shown above—cable drawn table top ingot car at work in a major steel plant.

● The table rollers are driven by Cleveland worm and gear sets and a Farval system for lubricating all bearings is built into the car.

TREADWELL

ENGINEERING COMPANY • EASTON, PA.

208 S. LA SALLE STREET
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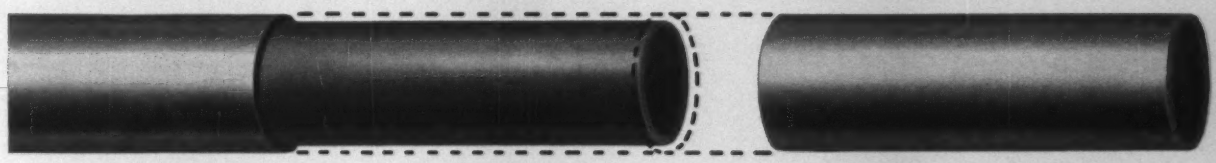
Repeaters
Handling Equipment (Kick-offs, Pilers, Cradles, etc.)

CASTINGS—Electric Furnace Steel, Ductile Iron, Gray Iron and Ni-Hard

Call Carpenter*

or your nearest authorized Carpenter distributor

...*for BI-METALLIC TUBING

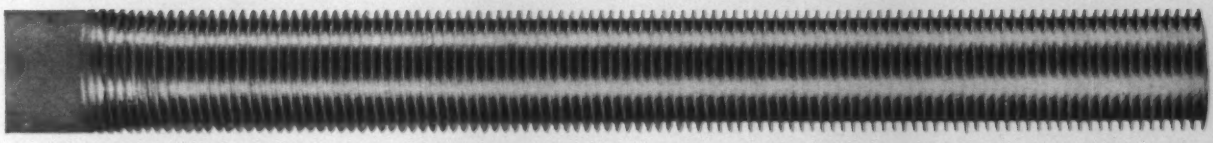


Carpenter Bi-Metallic Tubing is the single answer to dual corrosion problems in heat exchangers and condensers. Simultaneously it provides effective resistance to two different types of corrosive attack on tubing O.D. and I.D. surfaces. It is ideally suited for retubing existing heat exchangers, condensers and other heat transfer equipment where tubing of a single material throughout will not satisfactorily meet dissimilar corrosive conditions on the shell and tube sides.

It consists of full-finished stainless tubing mechanically bonded to the entire I.D. or O.D. surface of carbon, brass, copper, stainless or other alloy tubing to form a single unified tubular structure. A full range of heat exchanger sizes, gauges and lengths is available. Tube ends can be fitted with ferrules of the same metal as the inside tube for installation in tube sheets. Ask for Bulletin BMT.

...*for INTEGRAL-FINNED TUBING

Stainless and High Alloy Analyses



Carpenter-Manufactured Integral-Finned Tubing offers significant operating and design advantages for heat transfer equipment operated in corrosive service conditions. It is a practical and economical means of increasing the effective capacities of existing plain-tube units. An appreciable reduction in the overall size of new heat transfer units is possible with Carpenter Integral-Finned Tubing, with resultant savings in materials and space.

Approximately 2½ times greater external heat transfer area than plain tubing is obtained with Carpenter Integral-Finned Tubing. It is equally suitable for straight-tube and U-tube bundles, coils and other tubular arrangements needed for heating or cooling functions.

Produced from plain-surface full-finished stainless steel tubing of heat exchanger quality, Carpenter Integral-Finned Tubing has 16 fins per inch of length with standard height of 0.0575″. Diameter of finned portion is 0″ to 0.025″ less than the diameter of the unfinned portions. Continuous or spaced finned sections can be supplied.

Lengths up to 25 feet are available in sizes, gauges and analyses generally required for heat transfer equipment. Send for Bulletin IFT.

Call nearest Carpenter office or distributor for quotations and delivery on Bi-Metallic and Integral-Finned Tubing, and for technical help with their application to fit your needs.

The Carpenter Steel Company, Alloy Tube Division, Union, N.J.

your master key to cost-saving corrosion control

Stainless Tubing & Pipe

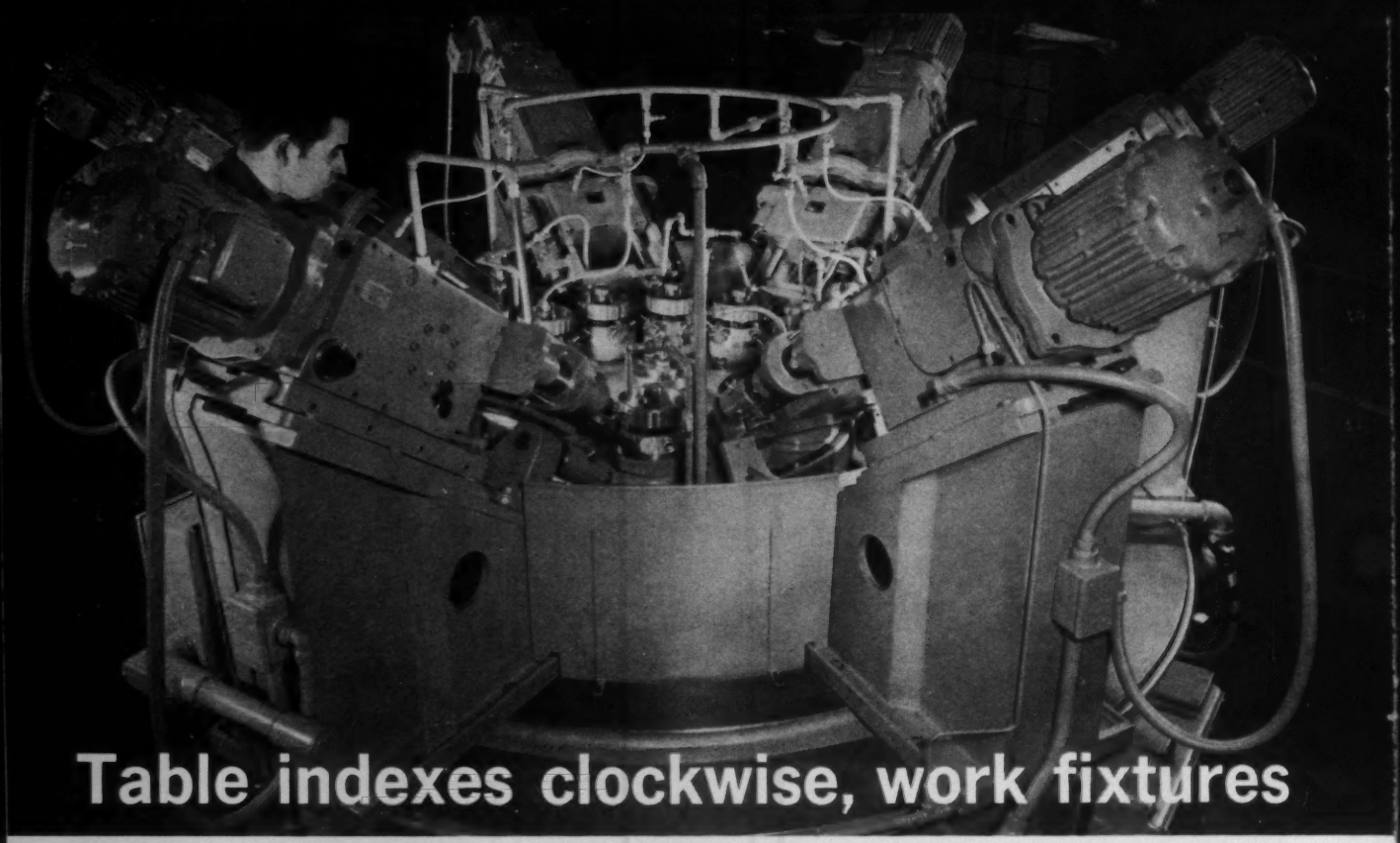


Table indexes clockwise, work fixtures counterclockwise for 6 holes 60° apart

Kingsbury machine drills and c'bores 135 steel forgings per hour gross

Problem: C'bore and drill six angular holes 60° apart in a forged steel gear.

Solution: Six drilling units with two-spindle heads are mounted on angular columns 60° apart on a circular base. An index table holds 12 work fixtures that do not turn with reference to any fixed point. As the table indexes clockwise 30°, each fixture indexes 30° counterclockwise. The work remains clamped as it indexes.

Each unit operates two tools downhill at a 27° angle. The first tool counterbores .1562 diam. at one station for an accurate start. The second drills .0937 diam. through at the next station. The operator changes parts in his fixture while the units perform their automatic cycles. Two tools operate at the same time on the part at the rear station.

Uniform Parts that Gage Maybe this seems simple. But it takes some doing to . . .

— build 12 fixtures that are exact duplicates, each one to hold the work firmly and accurately;

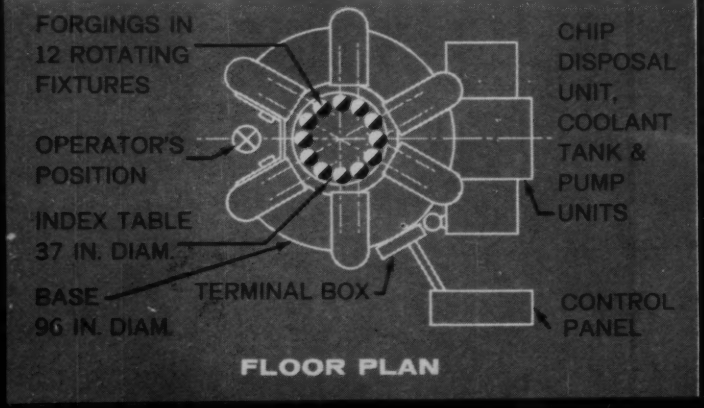
— remove backlash from the gears that index the fixtures;

— start angular holes straight and in exact position.

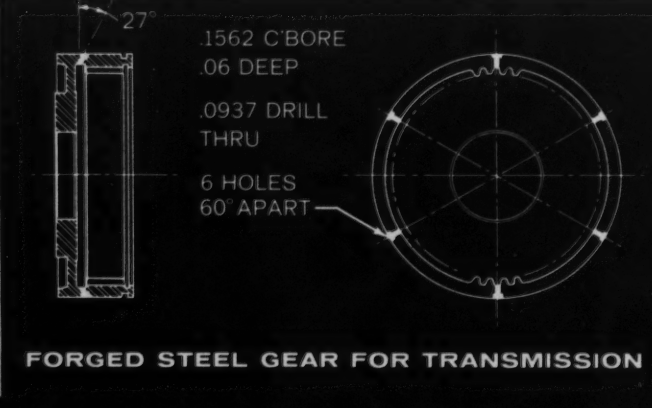
We specialize in solving such problems. Our machines have good basic design and accurate rugged construction to produce uniform parts that gage.

May we make you a proposal? You can then place one order for the entire machine and make us fully responsible that it meets your specifications. Kingsbury Machine Tool Corp., Keene, New Hampshire.

KINGSBURY MULTI-UNIT AUTOMATICS


FORGINGS IN 12 ROTATING FIXTURES
OPERATOR'S POSITION
INDEX TABLE 37 IN. DIAM.
BASE 96 IN. DIAM.
TERMINAL BOX
CHIP DISPOSAL UNIT, COOLANT TANK & PUMP UNITS
CONTROL PANEL

FLOOR PLAN



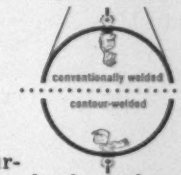
FORGED STEEL GEAR FOR TRANSMISSION

"The Gravity Kid" shows why

CONTOUR-WELDED TUBING OFFERS GREATER FATIGUE STRENGTH, LONGER SERVICE LIFE

Tubing fatigue strength depends largely *on how the tube is welded,* and the results obtained. Tubing that's smooth inside — free of flaws and bulging weld beads — offers much greater fatigue strength and longer service life.

Contour-welded* *tubing is smoother inside* than conventionally-welded tubing. It's smoother because *it's welded at the bottom.* Gravity pulls the metal down so that the weld corresponds to the tube's inside contour. There's no bulge on the inside surface. Even on the outside, the seam closely conforms to the tubing shape.



Contour-welding provides greater strength than conventional welding, because in conventional welding, gravity pulls the molten metal down into the tube. This can form a bead that is difficult to remove by cold working. And cold working can lead to deep, sharp undercuts that seriously weaken the tube.

Contour-welded tubing is smoother than seamless, too. That's because it's formed from uniformly rolled strip steel; whereas, seamless is produced by extruding or piercing. This strip is 100% inspected. So, there are no undetected tears or fissures inside.

See for yourself why Contour-welded tubing offers greater fatigue strength, longer service life. Write today for our free 48-page manual which describes tubing sizes from 1/8" to 40" O.D., in stainless and high alloy steels, titanium, zirconium, zircalloy, and Hastelloy**.

*U.S. Patent 2,716,692

**Trademark Haynes Stellite Co.

TRENTWELD® Stainless and High Alloy Tubing

Trent Tube Company, a Subsidiary of Crucible Steel Company of America, General Offices and Mills: East Troy, Wisc.; Fullerton, Calif.

NEW FROM FAIR STREET • HOME OF THE JIGMIL

new series

"Designated the model 'H,' our new Jigmil series provides greater range, is more rugged, easier to operate and more accurate."

"Available in spindle sizes ranging from 3" to 5", the new 3H, 4H and 5H machines greatly increase JIGMIL range for precision boring, milling, drilling and other operations. The new series introduces simplified controls, thermal control of main spindle bearings for increased accuracy . . . wider bed and table for added stability and working range . . . stainless steel way covers for positive protection . . . features that reach a new standard in JIGMIL accuracy, ruggedness and simplicity of operation. And like all JIGMILS, the 'H' series is available with the DeVlieg Diatrol direct dial dimensioning system or Tapac* —DeVlieg's own system of automatic tape control."

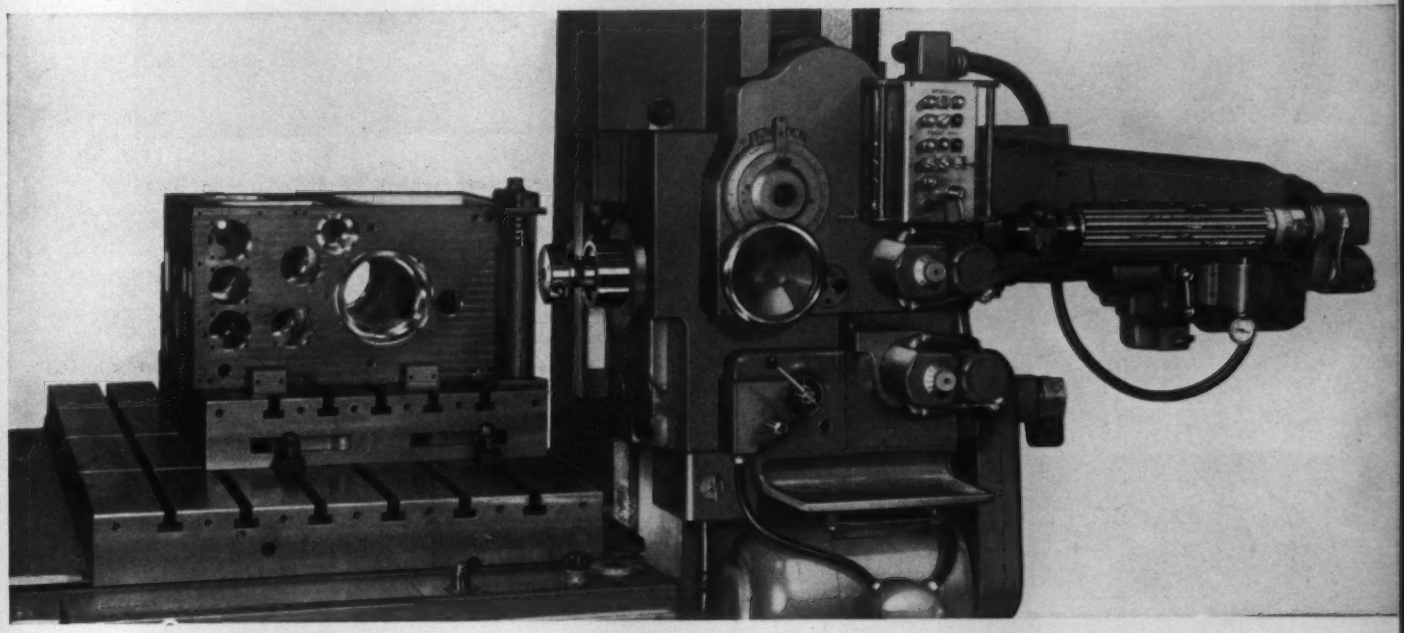
R. A. JERUE
Vice President in Charge of Engineering

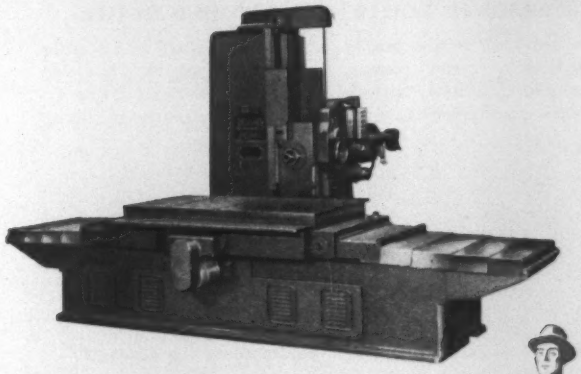
**Tape Automatic Positioning And Control*

DEVLIEG MACHINE COMPANY, FAIR STREET • ROYAL OAK, MICHIGAN

"H" Jigmils®

with Duplitrol • Diatrol • Tapac





Illustrated above is a Precision Spindle Head Casting being machined on a Model 3H-72 Spiramatic JIGMIL. Series 3H machines have 3" diameter spindle bar, 36" vertical travel and 48", 72" or 96" horizontal travel, designed for machining all types of production work and one-piece jobs in the medium size range.

Rewarding revelations in automatic precision await your next visit to Fair Street

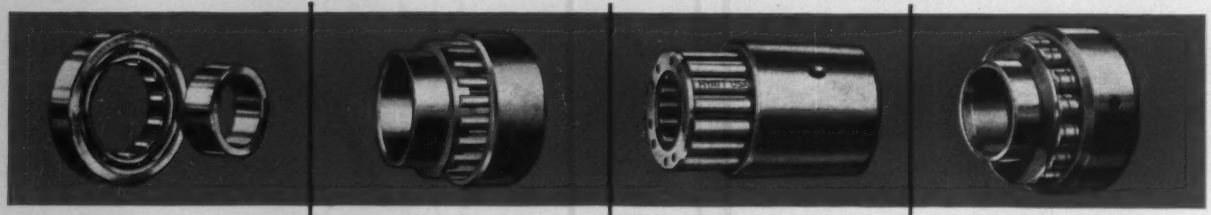
DeVlieg

SPIRAMATIC JIGMILS®

ACCURATE HOLES AND FLAT SURFACES IN PRECISE LOCATIONS

NO BEARINGS carry radial loads like cylindrical bearings...and NOBODY knows them like HYATT

Whatever your roller bearing problem, you'll find a type to solve it in America's most complete line of cylindrical bearings—HYATT Hy-Rolls! Their greater load capacity is particularly helpful when heavy loads must be carried in cramped quarters. To save space, inner or outer races can be omitted from separable types. Shouldered-race types will also take thrust and locate heavy shafts dependably. You can *depend* on the advice of your HYATT Sales Engineer—and the bearings he recommends! Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.



METRIC SERIES

High-capacity cylindrical roller bearings for heavy radial loads and light or intermittent thrust loads.

INDUSTRIAL INCH

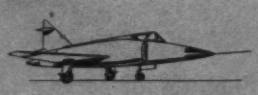
Designed for slow-moving, heavily loaded machinery where large-diameter shafts are usually employed.

TRUNNIONED ROLLER

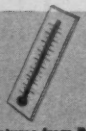
For industrial trucks, textile machinery, gear pumps, conveyors, hoists, agricultural equipment, etc.

WOUND ROLLER

A three-part separable bearing which provides maximum resistance to shock, abrasion and fatigue.



For Speeds up to 50,000 RPM—HYATTS are designed to meet almost any speed requirement, ranging from slow-moving construction equipment to supersonic jet engines.



For Temperatures from Below Zero to 450° F.—Conventional steels can be heat-treated for operation up to 450° F. Special high-temperature steels can be provided when required.

In Sizes from ¾" OD to 14' OD—HYATT offers a wide variety of bearing types and sizes—each quality-designed and quality-controlled to provide longer life.

For Loads up to 103,000 Lbs.—From small bearings for lawn mowers to heavy-duty types used in giant industrial cranes, HYATT builds bearings to carry any kind of radial load.

6 BUILT-IN BENEFITS:

★ Higher radial load capacity ★ Minimum space requirements ★ Omitted races are optional ★ Shaft location without sacrificing load capacity ★ Easier assembly and disassembly ★ Heavier press fits simplify retainment.

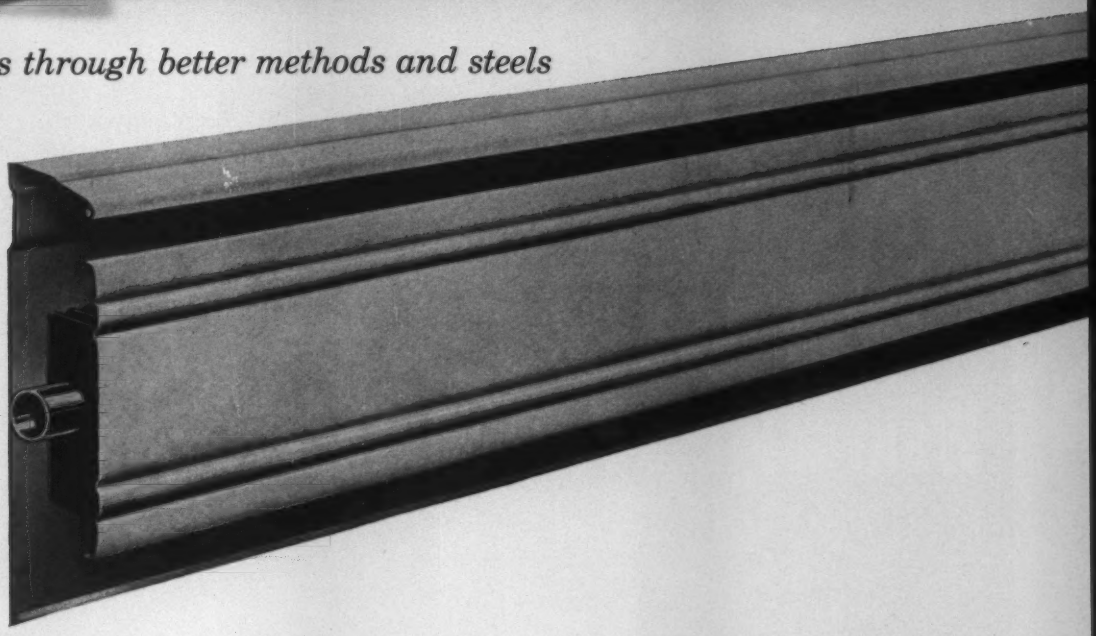
Available through United Motors System and its Independent Bearing Distributors

THE RECOGNIZED LEADER IN CYLINDRICAL BEARINGS

GM GENERAL MOTORS

HYATT HY-ROLL BEARINGS FOR MODERN INDUSTRY

Better products through better methods and steels



With Weirzin: easy fabrication of beautiful baseboard heating panels that last and last and last.

This high quality electrolytic zinc-coated and bonderized steel sheet is produced to our customers' requirements for uniformity of gage, width and temper. This attention to quality along with the excellent corrosion resistance provided by the zinc coating puts Weirzin at the top of its category and around the bottom of an increasingly large number of commercial and residential interiors.

There, these baseboard heating panels provide a functional border of beauty that requires little or no maintenance. The chemically treated surface holds the smoothest of paint jobs and the tight zinc steel bond eliminates all possibility of underfilm corrosion. Proof that despite the severe bending and forming it undergoes, Weirzin maintains a flawless bond between the zinc coating and the steel sheet.

Result? The fabricator enjoys the workability of a fine product and the ultimate consumer benefits from its serviceable beauty. And that's true of any product made from Weirzin.

Strong, smooth Weirzin electrolytic zinc-coated steel is manufactured by Weirton Steel Company. Its high quality is typical of the many other steels produced by Weirton and used throughout industry to improve products, methods and profits.

Steel

Look for the STEELMARK on the products you buy; place it on the products you sell.

WEIRTON STEEL
Weirton, West Virginia

WEIRTON STEEL COMPANY

Weirton Steel is a division of **NATIONAL STEEL CORPORATION**

Want a Press to Triple Your Forging Output?

We'll build the press for all your forging requirements . . .

Tell us your forging problems and give us your production specifications—we'll do the rest.

Erie Foundry, one of the first companies to automate forging, can provide specially designed *high-volume* presses in capacities of 1000 to 8000 tons. Instead of the three machines and nine men formerly required, now you need only one Erie automated forging press and only one operator observer—to triple your present production rate! Trimming, too, can be accomplished in a single production cycle. With billet supply and finished part removal conveyorized, it is possible to achieve a production volume of, say, 1200 track-link forgings per hour.

Erie Foundry has a complete line of machines designed for high volume production of such parts as connecting rods, gear blanks, automotive and tractor valves, pinions, track links and wheel hubs.

We would like to discuss application of automated presses to your production requirements. For the complete story, phone or write Mr. R. E. Sanford, Erie Foundry Company, Erie 1, Pa.

ERIE

ERIE FOUNDRY CO.

The world's great name in forging since 1895 EF-60-01

Combining high strength, corrosion resistance and toughness:

HERCULOY*
SILICON BRONZE CASTING ALLOY

Herculoy is an economical replacement for the costlier high tin content bronzes for many applications. It finishes to a rich golden color. Its strength is comparable to low and medium carbon steels. Its corrosion resistance is comparable to that of pure copper. Herculoy, with extremely low electrical conductivity, is also non-magnetic, easily worked hot, castable without the need for deoxidizing agents during melting. Write or call for new Herculoy literature: Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, N. Y. Telephone REctor 2-9500, or call your nearest Federated sales office.

*Patented by Revere Copper and Brass Incorporated; alloyed and marketed exclusively to the casting industry by Federated Metals Division.

Among the thousands of "hardware" products manufactured by the A. B. Chance Company of Centralia, Mo., are eyebolt castings for the electrical industry. These castings require a tough, high strength, corrosion resistant material with low electrical conductivity. Herculoy provided this unique combination of properties.

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

FEDERATED METALS DIVISION

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Chicago: Essex 5-5000
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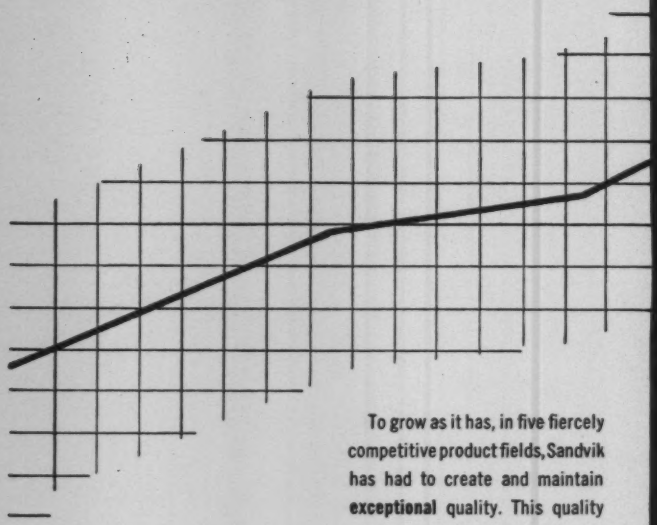
Extraordinary QUALITY

Major Reason For

SANDVIK'S GROWTH



. . . in SPECIALTY COLD ROLLED SPRING STEELS, WIRE AND TUBING
. . . in STEEL BELT CONVEYORS AND PROCESSING UNITS
. . . in COROMANT CARBIDE TOOLING
. . . in POWER SPRINGS
. . . in HAND SAWS AND TOOLS

To grow as it has, in five fiercely competitive product fields, Sandvik has had to create and maintain **exceptional** quality. This quality proves itself in outstanding and consistent performance. And, it is this performance which has earned, held and increased Sandvik's customers.

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SANDVIK

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Branch Offices: Cleveland • Detroit
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SS-202

WHEN YOU SPECIFY GRANULAR REFRACTORIES
CAPACABILITY OF THE SUPPLIER IS BASIC

capac

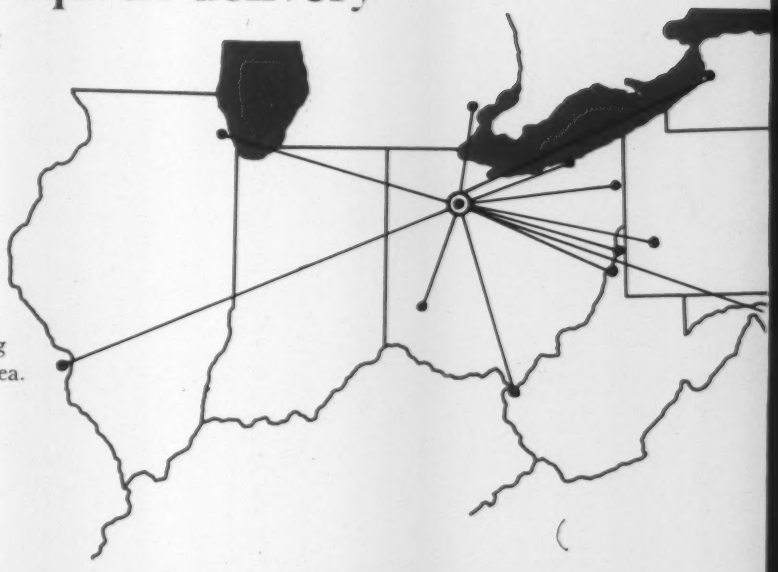
ability

basic's capacity and ability to provide steelmakers with better granular and tar-bonded refractories

with capacability...quick delivery

Almost exactly in the heart of steelmaking America, Basic's main plant at Maple Grove, Ohio ships refractories virtually at the flick of a finger. Its strategic location on two rail lines—at the junction of the Pennsylvania and Nickel Plate Railroads—is another reason why *you can look to Basic* as a quick and absolutely dependable source of supply.

For the convenience of Midwestern steelmakers Basic maintains a distribution center at Hammond, Indiana . . . providing delivery within minutes to the Chicago area. Extensive facilities at Gabbs, Nevada serve Western steel producers with a complete line of magnesia refractories.



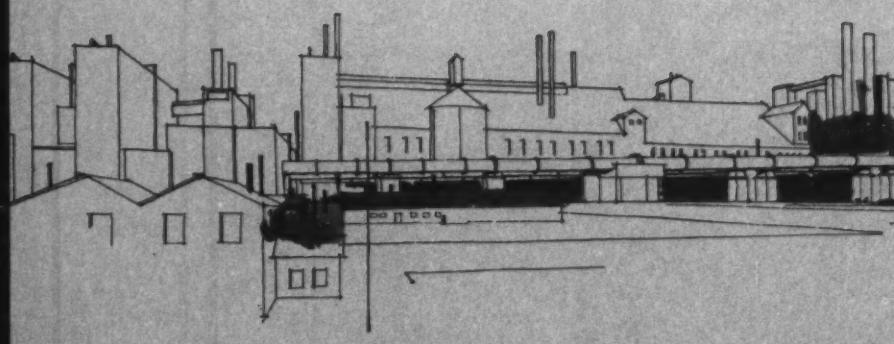
ability basic's with

DEAD-BURNED DOLOMITE

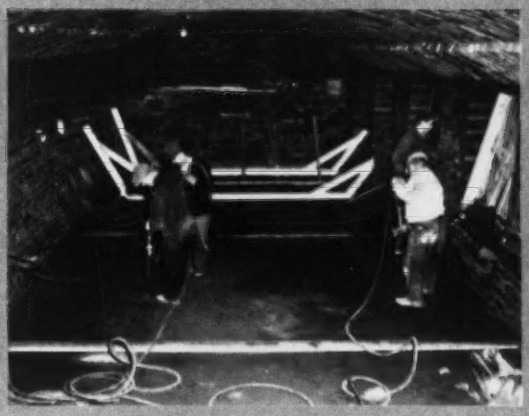
Basic's dead-burned dolomites, MAGNEFER and SYNDOLAG are used for routine furnace maintenance in virtually every open hearth and electric shop in the country. The reasons: uniformly high quality and outstanding performance—the result of continuous control during manufacture . . . carefully washed ore . . . accurately sized grains . . . precise blending and burning.

BASIC GUN REFRACTORIES

Such outstanding Basic gun refractories as GUNDOL and GUNMIX have contributed immeasurably to quicker, less expensive furnace maintenance. In many cases refractory costs are cut in half, with less labor and downtime . . . using only one material for both slag line and furnace wall maintenance.

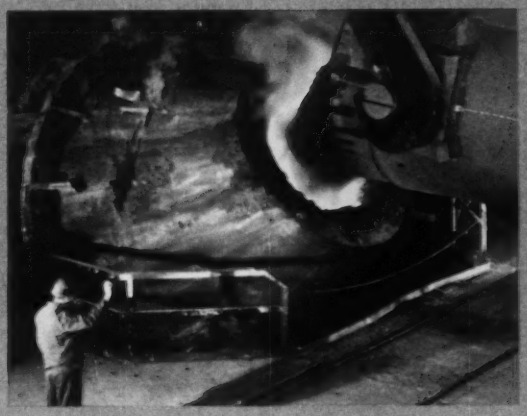


's vision to supply steelmakers better refractory products



SPECIAL MAGNESIA REFRACTORIES

Basic's ramming refractories, RAMSET and RAMICLASE have become the standard of comparison for open hearth and electric furnace bottom performance. Steelmakers know they can depend on Basic's proven ramming mixes for both original hearths and hot and cold furnace maintenance. Other easy to use maintenance materials like SHOVELPATCH save furnace time and extend lining life.



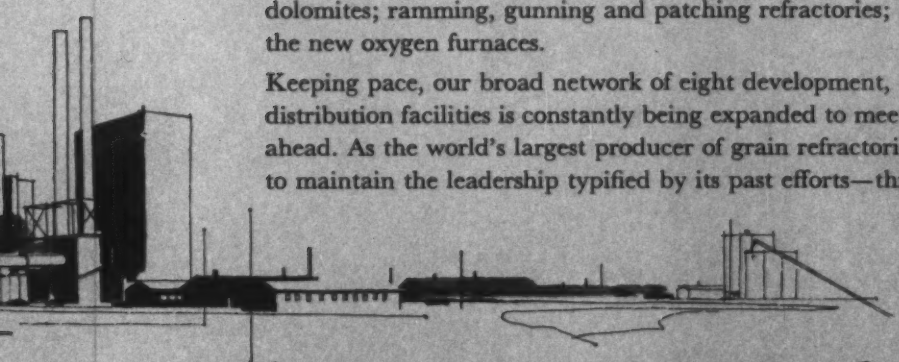
TAR-BONDED REFRACTORIES

Basic's tar-bonded refractories, TARBLOK and TARMIX are comprised primarily of dead-burned dolomite from Maple Grove and/or dead-burned magnesite from the company's Gabbs, Nevada facilities. Produced in a special plant, Tarblok and Tarmix are shipped to practically every oxygen steel producer in the Western hemisphere.

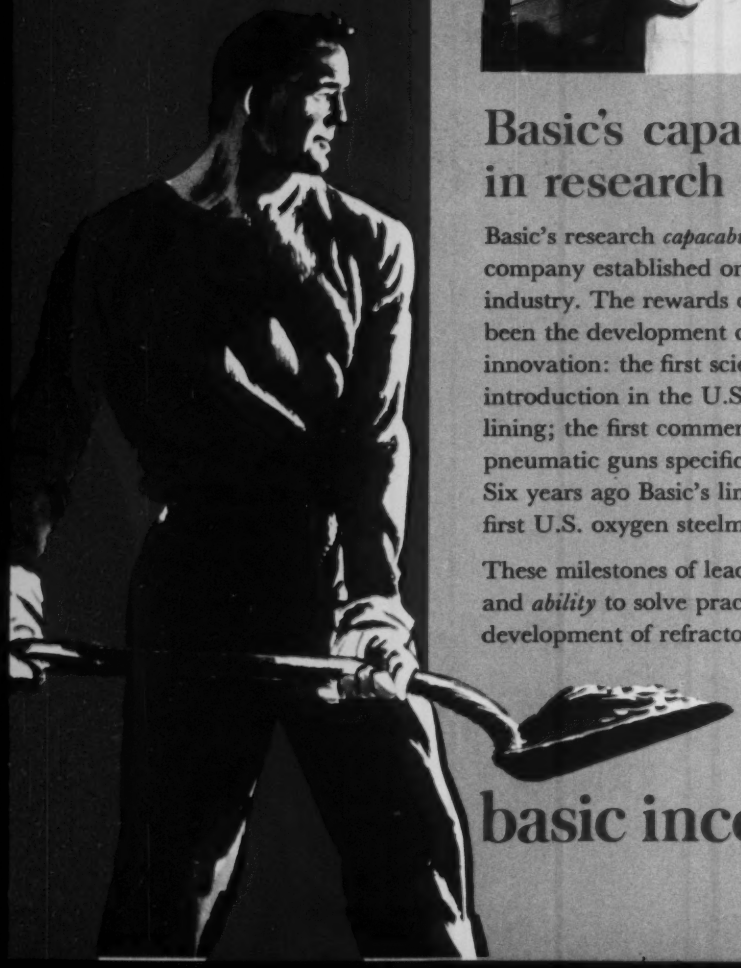
basic reflects capacability...

the *capacity* to manufacture and deliver quality refractories—the *ability* of talented and creative people to do a better job through vision, resourcefulness and skill. With capacability, Basic better serves the changing needs of steelmakers with a complete line of more than thirty hearth lining and maintenance materials—dead-burned dolomites; ramming, gunning and patching refractories; and tar-bonded linings for the new oxygen furnaces.

Keeping pace, our broad network of eight development, manufacturing, and distribution facilities is constantly being expanded to meet the challenging decades ahead. As the world's largest producer of grain refractories, Basic will continue to maintain the leadership typified by its past efforts—through capacability.



basic incorporated HANNA BUILDING CLEVELAND 15, OHIO



Basic's capacability in research and development

Basic's research *capacability* goes back to the early 20's when the company established one of the first laboratories in the refractory industry. The rewards of Basic's continuing research have been the development of virtually every major grain refractory innovation: the first scientifically prepared dead-burned dolomite; introduction in the U.S. of magnesia ramming mixes for hearth lining; the first commercial basic gunning refractories and pneumatic guns specifically designed for furnace maintenance. Six years ago Basic's lining refractories were used in the first U.S. oxygen steelmaking furnace.

These milestones of leadership reflect Basic's *capacability*—its *capacity* and *ability* to solve practical problems . . . to spearhead the development of refractory technology for a dynamic steel industry.

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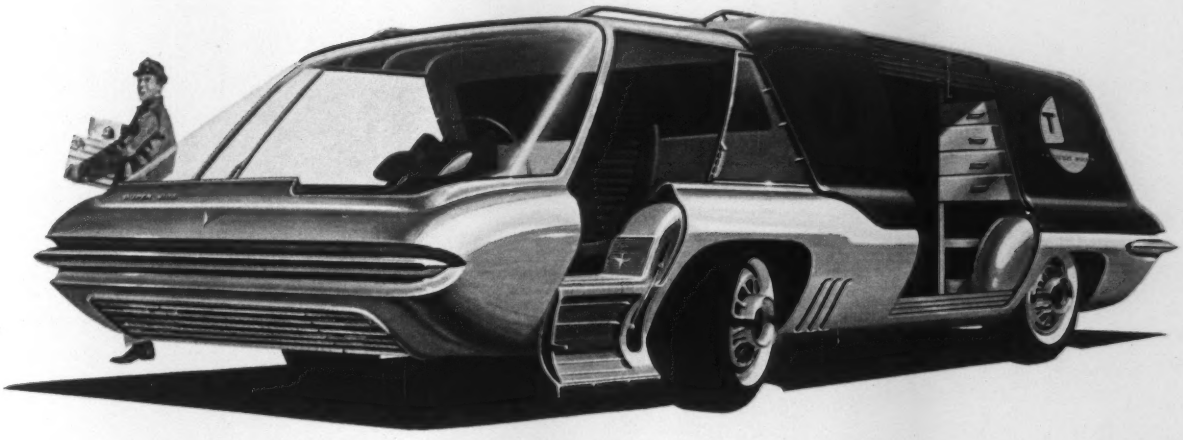
stainless steel

No other metal has the strength, beauty and versatile qualities that serve you so well today and promise so much for tomorrow.

There is nothing like stainless steel for THE AUTOMOTIVE INDUSTRY



McLouth Steel Corporation,
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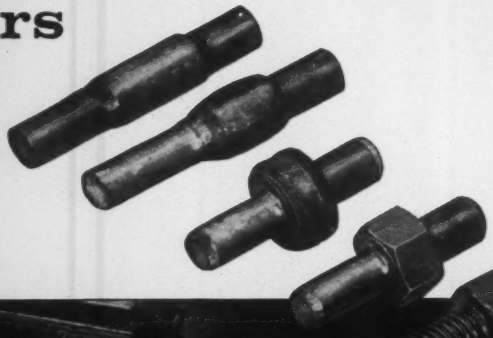
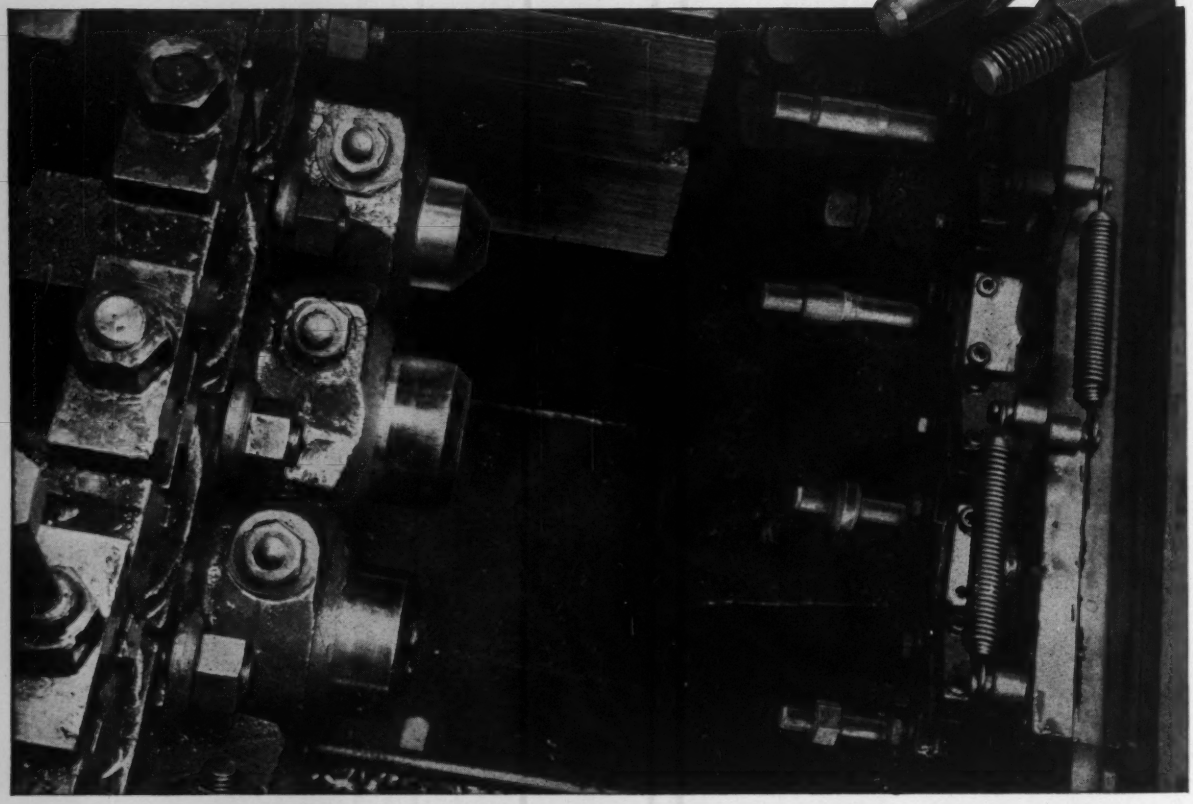
Manufacturers of high quality
Stainless and Carbon Steels

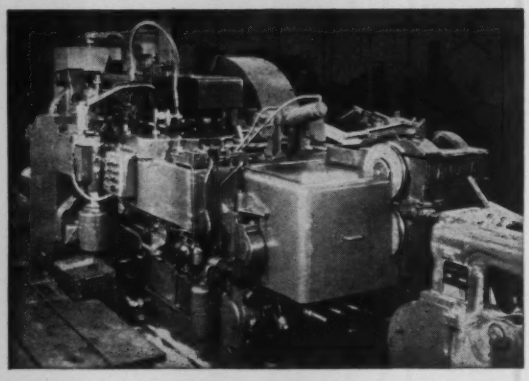
Look for the **STEELMARK** on the products you buy.

McLOUTH STAINLESS STEEL

Complex Fasteners Cost Less At Ferry Cap!







New 5 Station Boltmaker Gives You Free Forming Operation!

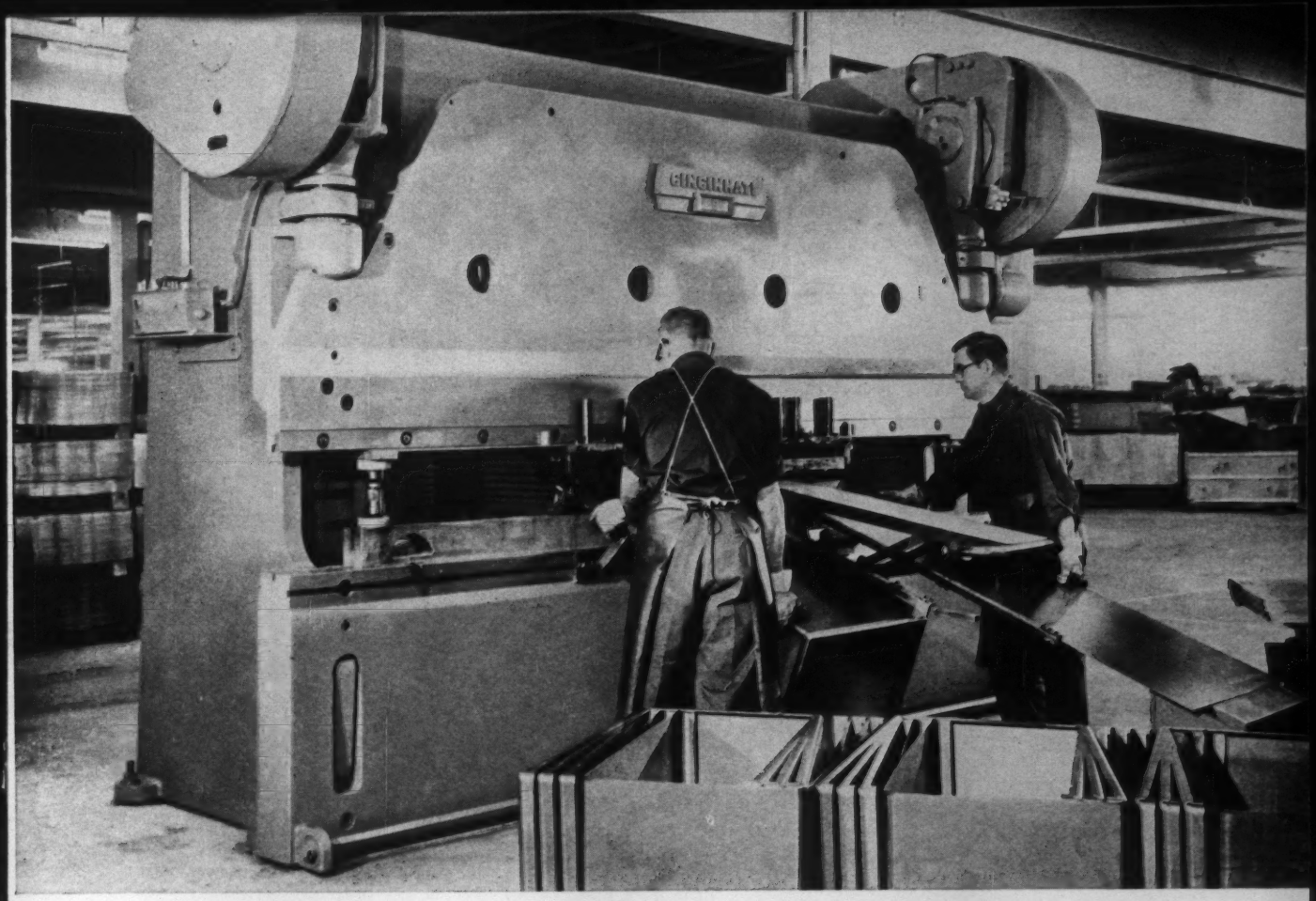
Our new National 5-Station Boltmaker, shown here, speeds production for a lower cost on your specially formed fasteners. You get *at least one* extra operation without added labor or part handling.

This extra *free* operation, while generally used for forming, can also be used to obtain greater dimensional accuracy. Either way, you get more for your money from Ferry Cap.

Years of experience, backed by modern equipment, make Ferry Cap an ideal source for your complexly formed or close-tolerance fastener requirements. Start saving now with a call to Ferry Cap today!

F-C

Ferry Cap & Set Screw Company
2151 Scranton Road, Cleveland 13, Ohio



Efficiency jumps 50%

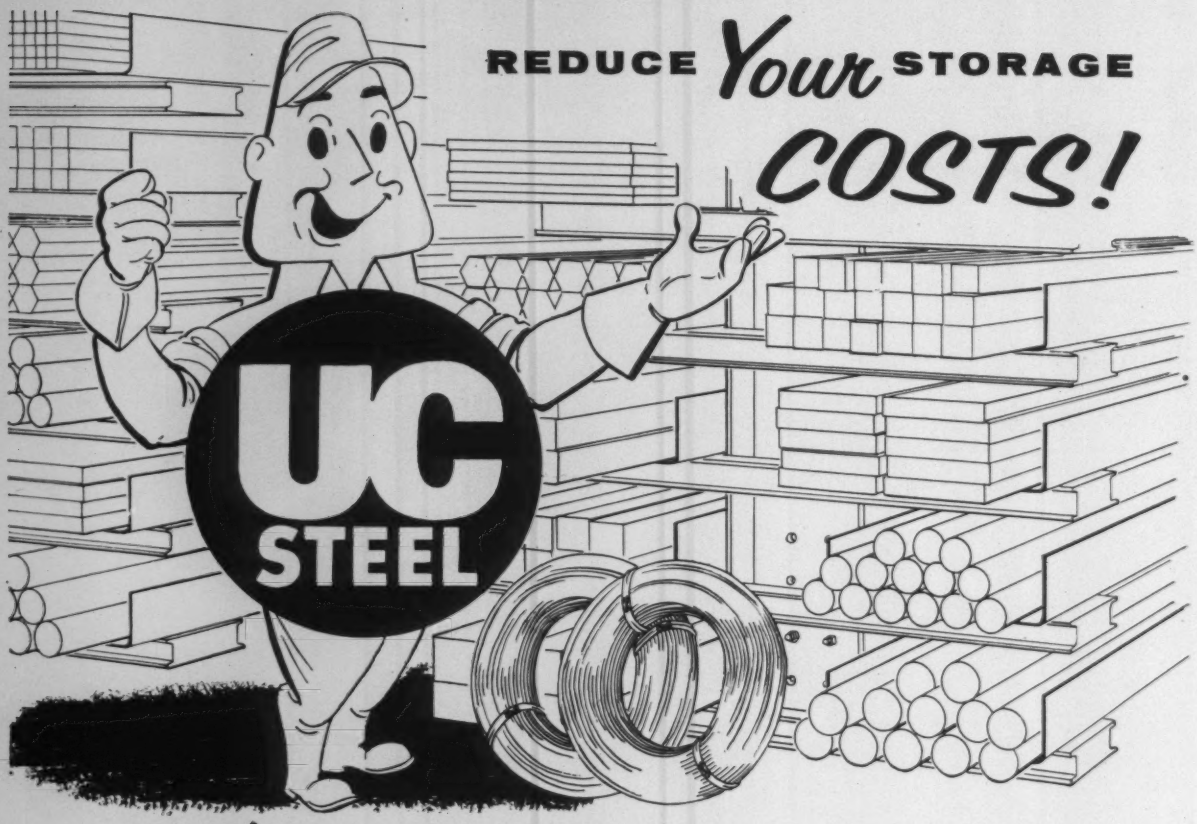
CINCINNATI® PRESS BRAKE FORMS PROFITS FOR STEELCASE

50% more efficient than previous method, this 225/150-ton Cincinnati forms four radius corners on pedestal bodies. "High degree of accuracy and convenient operation," according to Steelcase, help operators produce 80 pieces per hour. The machine operates more quietly and takes less floor space than their previous equipment.

THE CINCINNATI SHAPER CO.

Shapers / Shears / Press Brakes / Cincinnati 11, Ohio, U. S. A.

In Scotland: The Cincinnati Shaper Co., Ltd., Glasgow



REDUCE *Your* STORAGE *COSTS!*

We'll deliver...

- ✔ **STAINLESS BAR AND WIRE**
- ✔ **TOOL AND DIE STEELS**
- ✔ **HIGH SPEED AND MOLD STEELS**

as you need them

Get the steel you need, when you need it, from your local Universal-Cyclops Specialty Steel Service Center. Fast, reliable delivery from complete and expanded stocks relieves you of storage problems . . . frees more space for production.

Ready to help meet your specific needs are seven Universal-Cyclops regional stocks and three mills, directly linked by wire to your local district sales office.

Completely integrated, Universal-Cyclops has been a leading producer of specialty steels for more than 75 years. Uniloy stainless steels . . . tool, die, high speed and mold steels are quality controlled from melting operations to final inspection.

Call or write for your latest copy of the Universal-Cyclops Stainless Steel Stock List on Billet, Bar, and Wire.

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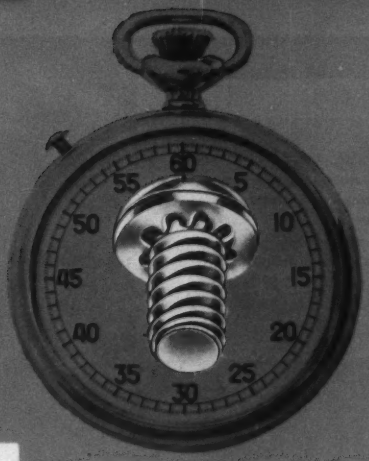

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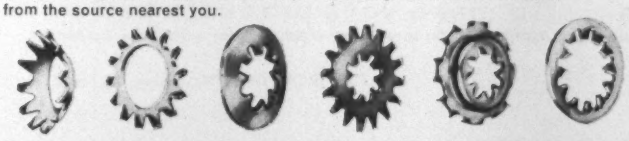

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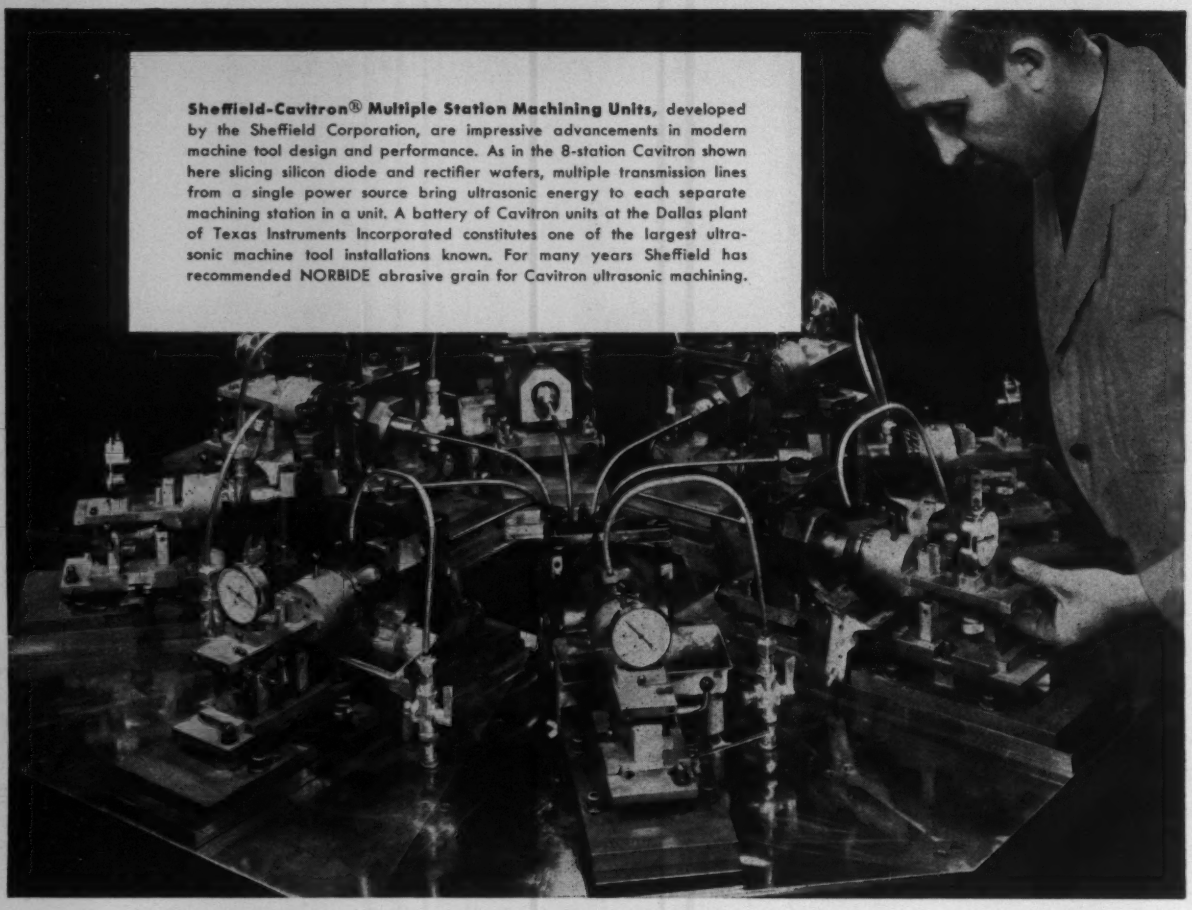

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STEEL MILLS ARE PUSHING HARD to win customers with development services. One project is a search for ways to cut steel costs for electrical manufacturers. One possibility in this area: A preservative that is also a drawing lubricant for the fabricator.

AUTO PRODUCTION DIP came as expected in the first week of November. Output for the week slipped to 145,000 cars, from 150,000-plus level of previous two weeks. Original car production schedules called for 1.9 million units in the fourth quarter. The figure since has been trimmed to 1.6 million, and now talk is in the 1.4 to 1.5 million range.

LOOK TO SHIFTING INVENTORIES in analyzing production gains. Dr. J. H. Hoagland, Michigan State U. professor, in viewing spotty production gains suspects that, "some of the increase may be due to finished goods being produced and inventoried to provide for faster deliveries required to meet increasingly competitive conditions."

APPLIANCE MAKERS' 1961 FORECASTS show that a growing number of companies are bracing themselves for mild declines from the low sales levels of 1960. One of the most recent projections, the most negative so far reported, predicts a 10 pct sales decline.

EASIER MONEY MAY NOT BE THE PUSH THE MARKET NEEDS, cautions economist Lewis H. Haney. Writing in the Bulletin of the National Association of Purchasing Agents, he says that supply is not the same as demand. "This is true in the case of money as well as in the case of other objects." Demand depends on desire, purchasing power, and the will to buy, he points out.

FURTHER CONSUMER HOLDOUTS can be expected, according to many market barometers. Two important examples: Unemployment jumped by over 190,000 in October to 3.5 million. And consumer debts are up $3.5 billion this year to a high of $55 billion. Labor experts and financial analysts see little hope for a quick turnabout.

A HANDY REFERENCE FOR MARKET RESEARCHERS is the Commerce Dept's. up-to-date booklet, Publications For Use in Marketing and Distribution. Sample publications listed: Developing and Selling New Products, Market Location Maps, and a Guide for the Newcomer to World Trade. Cost: Fifteen cents.

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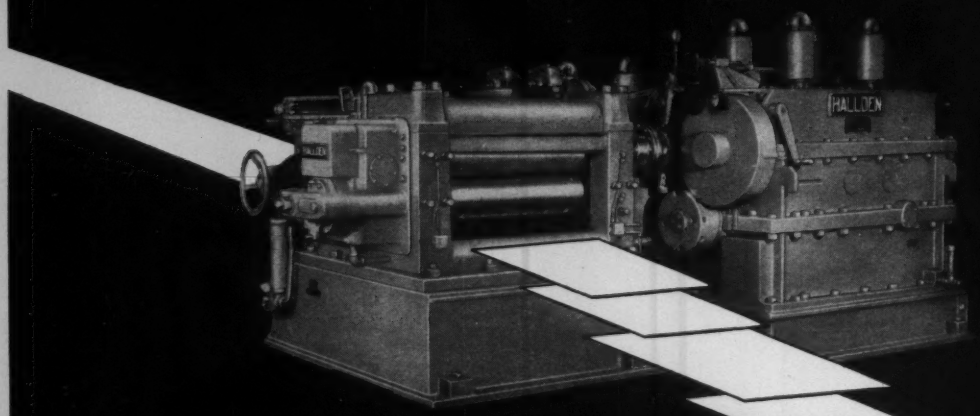

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SPECIAL REPORT

What the Election Means To Business

And What Business Men Say About It

The entire news staff of The IRON AGE brought together this report on the election results, their impact on business, and the reaction of individual businessmen to the Democratic victory.

The analysis of what the new Administration plans to do, and how it will effect business, was made by Washington editor R. W. Crosby.

■ The New Deal is back in the White house under the up-dated title of the New Frontier. How far the New Frontier can be extended by President-elect John F. Kennedy is the greatest question facing the U. S. and the business community.

The answer seems to be: The New Frontier will not succeed in radically reshaping the nation.

Take Care—But a word of caution: This does not mean there will be no reshaping. It does not mean that the new President can't push through some form of his extremely liberal legislative program. To the contrary. The next session of Congress will see such things as a minimum wage increase, a stronger medical care for the aged programs, and a loosening of restrictions on labor unions.

What it does mean, however, is that some of Sen. Kennedy's liberal economic ideas will be watered down. Though the moderating influences won't be found within the Kennedy administration, they are there. They are hidden in the forces of tradition and compromise in Congress.

Strong Executive — At first glance, the election seems to insure a New Deal.

This will be an aggressive administration. It will be led by the first president born in the 20th century, an aggressive young man of 43 with plans to shake the whiskers of tradition. His election insures liberal factions.

Sen. Kennedy will want to call the shots. And the U. S. will have a strong executive-type government. To back up his plans, he has Presidential patronage. Many a vote can be "liberalized" with a dip in the pork barrel.

Democratic Congress—The divided government which has existed in Washington since 1954 has ended. The Democrats control the Senate, the House, and the White House.

As President, Kennedy will greet the Democratic 87th Congress with a priority call for New Frontier legislation reminiscent of the first 100 days of Franklin D. Roosevelt's New Deal. The leaders of his Democratic majority in both houses have promised all-out effort to push his "must" legislation through.

Fast Action—By calling on Congress for quick action, Sen. Kennedy hopes to exploit a time-tested maxim that a president is never so persuasive with Congress as during the early weeks of his administration. In those early days, the legislators have not forgotten the new president's power at the ballot box.

Then, how can the New Frontier be anything but a complete success?

The answer is complex. First, the new president's power at the ballot box really was not so powerful. Though he received a fairly strong electoral vote win, President-elect Kennedy was virtually tied in the popular vote.

It was anything but a mandate for his liberal program.

Johnson's Role—Then there is Vice President-elect Lyndon B.

Johnson. Sen. Johnson said he would deliver Texas and the South and he did. Lyndon Johnson is not a man to stand in the shadows. He will demand a larger share of the executive power than any vice president of the past. This bid for power will hurt Kennedy in two ways.

One, it will mean a lessening of the President's influence in Congress. Sen. Johnson, in his new position as President of the Senate, won't be content to let Sen. Mike Mansfield (expected to be the Senate majority leader) wield the majority's power.

A Southerner—Two, Sen. Johnson, no matter what the Democratic platform says, is a southerner. Liberal programs most obnoxious to southern Democrats may not get the backing the new president expects from his vice president.

But, more important, in the first 100 days and the next four years, there will be a thorn in Kennedy's side called the "conservative coalition."

Remember the Rump Session—This coalition of conservative southern Democrats and conservative Republicans should be able to muster more votes than necessary to stop the majority when the chips are down. This group is similar to that which Senators Kennedy and Johnson could not cope with during the rump session of the last Congress.

Frontier Modified—The end result seems to be a modification of the New Frontier as it passes through the legislative maze.

So business and industry do not have to run scared. But neither can they expect a status quo. The 87th Congress will make many moves that business may have reason to regret.

Spending Factor—There is also a plus-side for business in the election of John F. Kennedy. Government spending will undoubtedly increase, especially defense spending. Money will loosen up. Construction will increase, especially school construction. And depressed industrial areas will get special attention.

But in these very points there is a minus side. Somebody will have to pay for them. Payment will either be by taxes or inflation, or both.

Many areas of government policy and legislation will show both pluses and minuses for business and industry. Following is an analysis of what to expect in specific areas.

What to Expect from the New Administration

The Budget — Revisions of President Eisenhower's budget for the year beginning next July 1 will be one of the President-elect's first orders of business. He hopes his budget will help push the Government toward the New Frontier. Many of the Government's foreign and domestic activities will be accelerated with increased appropriations.

Taxes—For the time being, Sen. Kennedy expects neither increases nor decreases in taxes. However, he will not hesitate to call for increases to advance his programs. Such increases would fall heavily on businessmen and industry.

The tax reform program forecast for the next Congress is probable. But the President-elect favors closing tax loopholes rather than broad reform. He says he views depreciation as an instrument for economic growth and will utilize depreciation changes to stimulate the economy.

Defense Policy and Spending—Kennedy is expected to increase defense spending to as high as $45 billion for the year beginning July 1. Some say it will be closer to $43 billion.

One thing is sure; he believes the present defense budget "inadequate." All things point to more defense contracts for industry, especially in the missile field.

Regulation of Business—Regulation will be more strict. Antitrust enforcement will definitely be more strict. Special shots will be fired at business mergers. And the Federal Trade Commission will grow.

Sen. Estes Kefauver will get Administration support to restrain "administered prices." Investigations, such as Kefauver's hearings on steel pricing, will be the means of restraint.

International Trade—Kennedy has promised a dynamic foreign policy. Part of the policy is to aid under-developed countries.

All this is fine for American business. But if businessmen are expecting protection against foreign imports, they will be disappointed. Kennedy wants to expand trade both ways.

Labor—Business influence will fade and union influence will come to the fore. After delivering the vote in metropolitan areas, union leaders will have a strong lever. Pro-union legislation will undoubtedly get backing from the White House.

Of course, he supports a jump in the minimum wage to $1.25.

Money Matters — Kennedy wants to shift some of the power for controlling money policy from the Federal Reserve Board to the White House. He is in favor of lower interest rates and will try to bring them down.

He is ready to use the power of office to control the economy and will enlarge the role of Government in Federal aid for housing, school construction and depressed areas.

How Business Sees the Election

Inflation, Taxes, Big Government Are Causes of Concern

■ The business world greeted the election of Sen. John F. Kennedy with what might be called constructive skepticism.

Of course, the vast majority of businessmen worked actively for and supported Vice President Richard M. Nixon. Their disappointment for business and personal reasons stands out.

But, underneath it all, most are determined to go ahead with current business plans. Few believe the election will change the course of the economy to a radical degree. But there are serious misgivings.

Interviews with leading executives by IRON AGE news reporters lead to this conclusion: Fear of inflation is the topmost reaction of businessmen to the election.

Other reactions are fear of higher taxes, concern over excessive Federal regulation of business, and general worry over "big government."

On the other hand, many in business, particularly in industries deeply involved in defense business, believe that stepped up defense spending will contribute to improved business under the Kennedy administration.

Another definite reaction is a "close-the-ranks" attitude on the part of many industrialists. Many others, noting the popular vote, caution the President-elect that his election was "far from a mandate" for radical reforms.

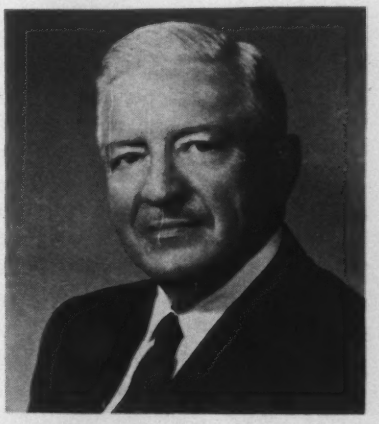
In the following paragraphs, The IRON AGE reports quotes from interviews of metalworking executives from coast to coast:

Charles H. Percy, president of **Bell & Howell Co.,** Chicago, served as chairman of the Republican platform committee. He also expressed his views on election issues in a pre-election interview in the IRON AGE (IA, Sept. 29, p. 85). Last week he said:

PERCY: "Some alarm."

"It was difficult to determine Mr. Kennedy's attitude on business and the economy. But late campaign statements on tax and depreciation reform were certainly encouraging. But his statements with regard to the government assuming a direct role in money rates to provide artificial money rates will cause some alarm. . . ."

"The business community must vigorously present its views on what is best for business, in either a Republican or a Democratic administration."



ROCKWELL: "Wish them well."

On the West Coast, **Charles E. Ducommun,** president of the large **Ducommun Metals & Supply Co.** had this reaction:

"Mr. Kennedy's election means this to me: 1. A lesser concern among government officials about inflation. 2. Increasing government interference with the private sector of our economy. 3. Enlarged government welfare activities. Under a Kennedy administration, businessmen must be extraordinarily careful about forward plans."

A close-ranks reaction comes from **Col. W. F. Rockwell,** board chairman, **Rockwell Manufacturing Co.,** who is known for his conservative beliefs. He says, "Let's wish them well and hope they can do something. If they can't, they have no alibis."

Among the hardest hit businesses are the machine tool builders. This is a typical comment from an industry spokesman, **H. N. Maynard,** president of **Snyder Corp.,** Detroit:

"What relationship the election will have to capital goods expenditure is hard to see. . . . The cry of doom bombarded on us in the past two or three months hasn't helped. It offset buying habits. The machine tool business is in its third year of low level business. . . . It will be very interesting to see how the relationship develops between Mr. Kennedy and Mr. Reuther. I think there are bills to be paid and I don't like it."

A middle-of-the-road comment comes from **Robert W. Galvin,** president, **Motorola, Inc.** He says:

"We will have to wait and see the long-range effect in terms of monetary and labor policies. I hope that Mr. Kennedy appraises his program with prudence. If he goes on a spending spree, business will be hurt in the long run."

A different reaction comes from

GALVIN: "Wait and see."

Neil C. Hurley, Jr. president, **Thor Power Tool Co.** He served as chairmain of the Illinois group of the Businessmen's Committee for Kennedy. He says:

"I don't think the election of either candidate would have produced a major business change . . . . My impression from many conversations with Sen. Kennedy is that he is most sympathetic to business. I think one of his first efforts will be to halt continuing unemployment.

"I think people are really going to be surprised at how conservative Jack Kennedy will be."

Most businessmen are looking to the auto industry as one of the key factors in any business recovery. **American Motors'** president **George Romney** had this to say on the election:

"With the election behind us, we will see an early return to normal car buying interest. In the short-range, the President-elect no longer has a political advantage in developing a recession psychology and there is more likelihood of favorable economic factors receiving more interest and public attention."

Charles R. Cox, president, **Kennecott Copper Corp.** also takes a mild view:

"I think Mr. Nixon put up a wonderful fight. The popular vote was very close, which is better for the country. I believe we should find a place for Mr. Nixon and other very capable losers in government. But, Mr. Kennedy is in, and we should do all we can to help him."

Dan A. Kimball, president, **Aerojet-General Corp.,** Calif., and Secretary of the Navy under former President Truman, is an optimist. In this sense, in addition to his former government service, his reaction reflects some of the feeling of defense-oriented businessmen. Mr. Kimball told The IRON AGE:

"The next administration is bound to move ahead in defense and space exploration if America is to meet successfully the dual challenges of Soviet aggressiveness and the pressing demands of man's persistent quest for knowledge and understanding of his universe. . . ."

ROMNEY: "Return to normal."

"We can look forward to increased research for fuels and metals and to real progress in electronics to increase the development of space platforms, and ultimately colonies on or near the various planets."

Martin M. Decker, president of **Decker Corp.,** Philadelphia instrument company, hopes that small businessmen will fare better under the new administration.

"The Democratic party will have a different concept regarding survival of small businesses. Money should be made available and more large prime contracts will find their way to the small businessmen."

Other comments:

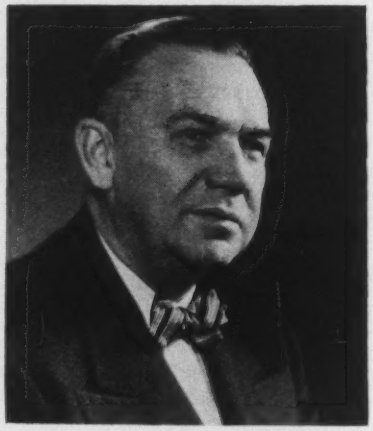
L. B. Smith, president, **A. O. Smith Corp.** "The fact that there was not a decisive support for either candidate imposes a heavy responsibility on Mr. Kennedy and on both political parties. The Administration will have to give careful consideration to those opposing philosophies expressed by Mr. Nixon.

T. S. Fitch, chairman and president, **Washington Steel Corp.** "I don't expect the country to go to the dogs and I don't expect business to go to the dogs. I expect there will be more inflation under Kennedy, but there would have been some with Nixon."

H. C. Lackey, president, **Erie Forge & Steel Corp.** "On the long pull, I am concerned about inflation. It will be the policy of the company to cooperate fully with the government."

J. E. Workman, president, **Latrobe Steel Co.** "We're not closing our gates. I don't believe it will make any major change in our operations. I would prefer to place our hope in the education of Congress to the need for reform of depreciation laws."

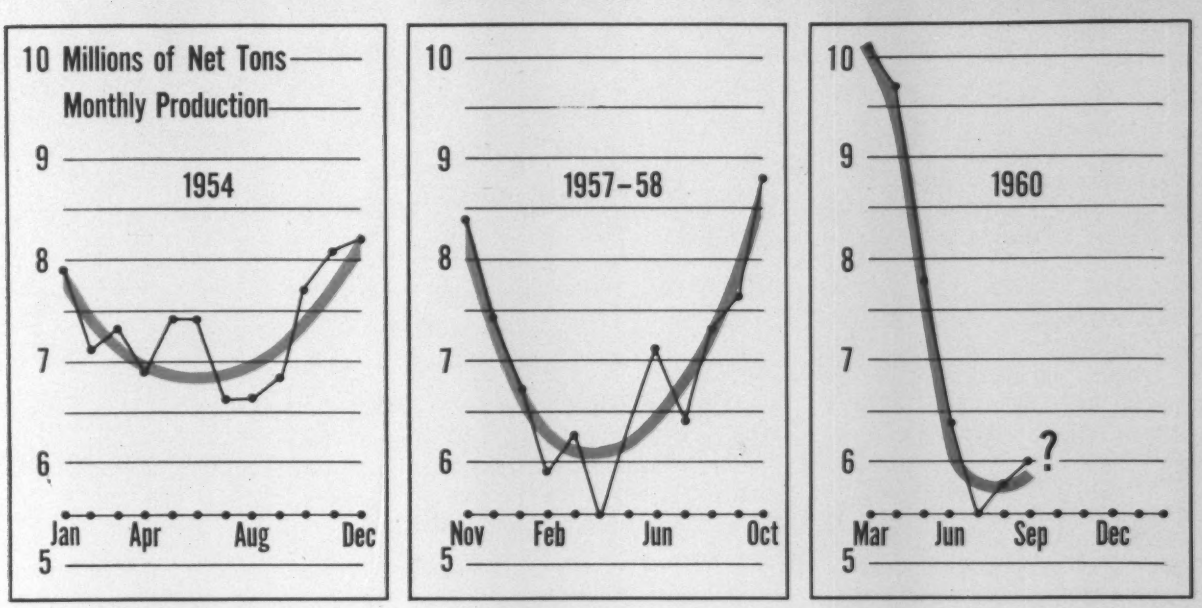
C. L. Holbert, president, **H. K. Porter Co., Inc.** "This is not going to change our plans. None of our planning was contingent on election returns."



COX: "A place for Nixon?"

Leo M. Harvey, president, **Harvey Aluminum Corp.** "With the inauguration of the new administration, industry can expect the Federal government to implement a program essential for the country's economy."

Will Steel's Recession Cycle Be Repeated?



Steel Recovery? By Mid-1961

Right now, it's hard to find any indicators that point to a substantial recovery in steel.

But by next March, the pickup will start to show, grow in size by mid-1961.

By Tom Campbell

■ The next move in the steel order market is upward. But when it will come is something else again.

For the past five months, the volume of new orders has changed. hardly at all. It has varied between 40 and 50 pct of steel ingot capacity. Differences among individual companies have been due to the product mix and whether they are suppliers to the auto industry.

Backlog Effect—The reason why the low order pattern did not show up in the steel ingot rate much sooner than it did (late in June), was because of the substantial backlogs on the books of all steel mills.

This week, steel order backlogs just don't exist. Exceptions are special cases such as line pipe orders. Most unfilled tonnages are nothing more than orders placed awaiting hasty processing.

Slight Pickup—In the past month or so, there has been a very slight upward change in the rate of new business. Where a few months ago it was not uncommon to see some companies book a weekly tonnage of less than 35 pct of capacity, that would be a rare and special incident today. Thus, it is likely that the bottom in new order volume has been reached. But it is just as true that there is no assurance that order volume will get up off the floor anytime soon.

Steel output is now due for a slight revision in trend. Because most steel companies had built up their stocks in anticipation of a much better fall business, they must now reduce some of their semi-finished steel inventories. Yet they can't go too far in this, lest they lose some business because they can't make the fastest delivery.

December Looks Dull—December is usually a dull, listless month in steel if the business trend has been downward or if so-called "normal" conditions are prevailing. That is the case this year. So this December will register a slight decline in the steel output—a decline which may see a rate of 45 pct for December and a holiday rate of less than 40 pct. of capacity.

But the seasonal decline in steel output will not mean that the steel economy is going backwards again. It means only that year-end factors carry a greater impact in a downturn period than they do when the economy is trending upward.

The steel industry, by the end of the year, will be in better shape to "start something going" than it was at the end of 1957. No mill backlog, skimpy steel inventories, and the chance that there will be labor troubles again in 1962 are factors setting the stage for the recovery.

Tough Going — Unfortunately, steel has had to take a special

depression of its own in its stride before it tackles the overall mild recession. Because steel has had tough going in order volume from last May doesn't necessarily mean it will sit up and take nourishment soon.

Inventory Question — If current steel consumption (chewing up rate) is less than a rate of 60 pct or just about 60 pct then steel inventories —relatively—are larger than they were a few months ago. That means inventory cutting — or at least partial living off inventories—is far from dead. It means too that the current steel order rate of 40 to 50 pct may be with us until sometime next March.

An overlooked factor in the recent steel recession: Many steel users let their steel come to them for months when they really did not need it. This represented steel order backlog. Because it was not needed by all those who received it, that meant lower "new" steel ordering. That explains some of the paradox of order volume being pegged around 40 to 55 pct of capacity as far back as last April and May while shipments were much higher.

Wait for the Cycle—The thing that will cause a change in steel is the same as what happened in the past: The cycle is changed and the move is upward. Inventories will be too low, there will be fear of a price increase and the smarter purchasing agents will smell the end of the steel labor armistice coming.

Those facts alone cannot make a boom steel market. But when you add anti-recession moves by the new Administration, higher defense spending, a recovery in home building, a re-entry into the steel market of the railroads, the oil and gas industry and the miscellaneous users, you have the makings of a boom.

The boom in steel will make its statistical start in March, 1961. Fuel will be on the fire by mid-1961. Customer uncertainty of supplies (when they are wanted) will show up by next Labor Day and the big drive to order "safely" will come in the first six months of 1962.

OPEN PIT OPERATION: With overburden taken away, iron ore mine in Central Onaman range, Ont., Canada, will be open pit operation.

Ontario Project Will Pelletize Iron Ore

■ Right now U. S. steel mills are not worrying about iron ore supplies. Large tonnages are available at a time when demand is down. But, despite this, there's interest in a new iron ore mining and pelletizing operation of Can-Fer Mines, Ltd.

The development is located in Ontario, Canada, about 90 miles north of the Lake Superior port of Nipigon. Can-Fer officials say it's important for several reasons.

Location and Price—Because of the type of ore and the location, it's pointed out, Can-Fer will be able to put down pellets in a Lake port at very competitive prices. The pellets would be coming in at the lower end of the cost scale of U. S. and Canadian low-grade iron ore mines. This might push down the raw materials cost of steelmakers.

In addition, the operation could offer a good source of pellets for U. S. mills with supply lines short enough to be free from possible cutoffs during international troubles.

Ore Analysis—Development of the mine on current plans could boost iron ore output in this area of Canada by 65 pct over 1959 tonnages. Experts from Bartley Greer Associates, geologists of Port Arthur, Canada, estimate reserves at well over 150 million tons of magnetite ore.

A Can-Fer spokesman says recent drillings on the company's 31,000 acre property "have indicated over 10 miles of additional ore zones. Step out drilling on the main ore body has also indicated substantial 30 pct grade tonnage."

Can-Fer is aiming at an output of 2 million tons of pellets per season. It expects the plant to cost about $30 million. Construction will begin early next year, with ore scheduled to begin moving to market by the 1962 season.

Notes on a Rise in Trade With Russia

Report on Europe

This is the fifth of a series of on-the-spot reports by G. F. Sullivan, editor of The IRON AGE, who recently completed his sixth peacetime visit to Europe.

■ Ask a European businessman why there is so much trade between Europe and the Soviet Union and you are likely to get a blank stare. This is usually followed by, "Well, why not?"

You explain that most people in the U. S. feel that heavy trade with Russia merely advances the Kremlin's timetable of economic —if not military—conquest of the West.

"We do not consider—as you Americans do—that we are at war with Russia," he replies. "Such an attitude is not in accord with the facts. One fact is geography; the other is that trade with Russia is important to Europe's economy."

The figures in the accompanying table show the size of U. S. and European trade with the USSR. This is not trade in arms, or in what the Coordinating Committee (COCOM) considers strategic goods. COCOM is made up of the 12 European nations listed below*, plus Canada, Japan, and the United States. Its job is to agree upon goods these nations will not ship to the Sino-Soviet bloc.

Although U. S. sales to Russia are up sharply this year, pressure to broaden the list of items that can be sold to the Soviet bloc has come, not from the United States, but from Europe. Said a British machine tool builder, "The embargo (since eased) on machine tool shipments to the Russians forced them to build a tremendous machine tool industry of their own."

The Russians might have built their own machine tool industry anyway; the point is now academic. They are now buying several types of tools in Europe—not a single prototype to be copied, but 20 to 50 at a crack. They, and the Chinese, are buying the smaller sizes of horizontal milling machines and horizontal boring machines. And they are buying transfer presses too.

The Russians sell lathes—which they make on transfer lines —in countries where they have loan or barter deals: i.e. Egypt, India, Ceylon, Indonesia, Burma, etc. They have also sold some in Austria. Except in Austria, service has been poor.

So far, most Soviet-bloc machine tool sales seem to have been politically oriented. But in five years or less, the Soviet-bloc could be a real threat.

Easing of the machine tool embargo saw European COCOM countries exporting some $17.5 million of metalworking machinery last year to Russia and its European satellites. For the U. S., the figure was $2 million.

The Europeans spent $14.4 million last year on Soviet-bloc machinery, mainly from East Germany and Czechoslovakia. The U. S. bought $487,000 worth.

Some U. S. machinery builders don't quite understand the rules because they seem to be inconsistent. The export manager of a New England firm explains that his company was asked by a Soviet purchasing group to quote on a complete tire-making plant. Washington said no. "What do you think happened?" he asks. "The job went to our British licensee."

US and European Trade With USSR

(In Millions of U. S. Dollars)

	1957	1958	1959	1960†
EXPORTS to USSR				
By COCOM nations*	$384.1	$410.6	$391.4	n.a.
By USA	3.5	3.4	7.4	22.4
IMPORTS from USSR				
By COCOM nations*	$527.7	$497.6	$626.2	n.a.
By USA	16.5	17.5	28.3	16.3

† Jan.-Aug.

What Europe* Sells to USSR

(Some 1959 Exports in Millions of $)

Machinery, non-electric	$91.1
Steel plate & sheet	43.0
Steel tubing	42.3
Copper products	22.8
Electric machinery & appliances	17.8
Transport equipment	16.7

*European COCOM nations: Belgium, Denmark, France, W. Germany, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Turkey and the United Kingdom.

Fluid Power Shows Flexibility

Growth Industry Acts to Realize Its Potential

Manufacturers of hydraulic and pneumatic components expected more business this year but got less.

However, many used the business decline as a springboard to improve marketing techniques.

By K. W. Bennett

■ What happens to a growth industry when business doesn't match expectations?

The fluid power industry is a top ranking grower. Estimates of yearly sales gains by member companies range from 6 to 20 pct. At the National Fluid Power Assn. meeting in Chicago, members added up the score after a slow 1960.

A check of manufacturers in the field suggests the average sales manager expected to sell 15 to 20 pct more in 1960 than he did in 1959, and at a higher profit per unit.

He probably sold 7-10 pct less than he did in 1959. And his profits were correspondingly lower per unit. He aimed at an $800 million market, but will hit only about $650 million.

Measure in Miles—A top company officer explained: "It's not how bad 1960 was that hurt us. It's how good we thought it was going to be."

Fluid power, which includes both hydraulic and pneumatic equipment builders, has a wide market target. The delicate firing valves of a Minuteman ICBM operate hydraulically. So does a bulldozer blade.

Instruments, machine tools, industrial machinery, missiles, aircraft, farm equipment, construction equipment, are all prime markets for fluid power builders.

Hydraulic and pneumatic cylinders, valves, and pumps are the main items produced. But the accessory market is huge. At a single North Chicago plant, Goodyear Rubber Co. reels out 10,000 miles of pneumatic and hydraulic hose per year.

Nearing Bottom? — Where do fluid power men expect to go from here? Most feel the steady 1960 falloff in new orders is halting. November appears to be leveling. First quarter should see mild seasonal gains from farm and construction machinery builders. Aircraft and missile builders are boosting purchases, but only slightly.

Fluid power men report orders from industrial machinery builders were relatively higher than incoming orders from farm equipment and construction equipment builders. In one case, machinery and machine tool customers cut back buying by 15 pct; mobile equipment orders fell by over 30 pct.

Exceptions prove the rule. Harvey Scheffer, president, Sheffer Corp., told The IRON AGE, "Our sales are 35 pct above last year. But let's face it, industrial machinery is one of our big markets, and that held up better than others. Second, we boosted our selling force heavily over 1959. We'd expected to do 50 pct over 1959 levels on our maximum forecast."

Up, Down, Sideways — N. P. Whitney, Industrial Products Div., Cessna Aircraft Co., reports, "We carry a fairly full line of hydraulic products. I believe 1960 sales will run 10 pct under 1959, and that was a record year. We're counting on considerable advances in 1961. A 20 pct gain isn't out of sight."

Marketing vice-president R. W. Cornell, Parker - Hannifin Corp., adds, "We're at a flat spot. There are mild seasonal gains in some market areas, but I suspect we'll hold close to present levels through

REMOTE CONTROL: Hanna Engineering Works engineer adjusts limit switches to change position-stops of a fluid power cylinder used to regulate a pipeline valve by remote control.

the first quarter. I think the industry has bottomed out."

William Kunkė, vice president, Hanna Engineering Works, notes: "We've been turning over stones looking for orders. Orders aren't moving up, but we're more hopeful. I think we've leveled off. By the second quarter of 1961 there should be an increase that will push 1961 up 10 to 15 pct over this year's levels."

How Many?—Comptroller R. O. Jensen, Char-Lynn Co., sees only seasonal gains through December. From that point, he expects a good first half following a gradual first-quarter buildup. His guess at 1961: At least equal to the record levels of 1959.

The industry is relatively young. Marketing men admit that statistics are still shaky. They'll "guess" that the industry exceeded $650 million in sales during 1959, the all-time high.

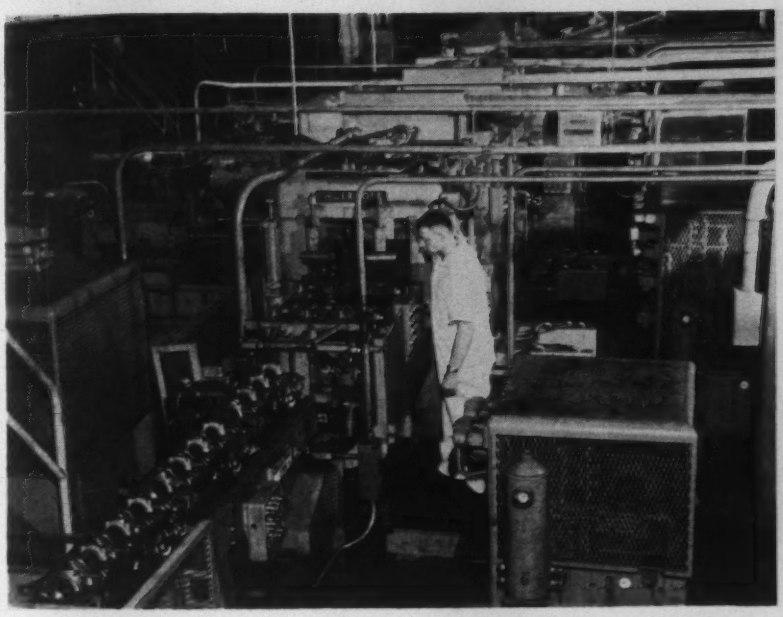
It's not even clear how many firms are in fluid power manufacture. But it's clear this field is growing rapidly. Dept. of Commerce estimated 288 manufacturers in 1957. Current guesses put the number at 366.

These guesses are advanced by industry members with the warning that they are conservative. In fact, on the basis of average company growth reports, 1959 dollar sales should have been well over $700 million.

More R&D—However this pie is cut, the industry is a growth industry. If anything, the sales battle of 1960 has made it more keenly conscious of the need to stay that way.

Research and development outlays are soaring. At least three hydraulic firms bought independent research laboratories, complete with personnel, to create their own R&D departments over the past year.

One company, Racine Hydraulics, & Machinery, Inc., is building toward an R&D staff that will represent 10 pct of total workforce. At the same time, it cross-licensed with Vickers-Armstrong, Ltd., to add British patents to its product line (see IA, Sept. 8, '60, p. 13).



LONG LINE: This 96-station Greenlee pallet-type transfer machine, which machines 300 powersteering gear housings per hour, uses Vickers hydraulic pumps and controls throughout its 508 ft transfer line.

Attractive Field—The prospect, despite the 1960 setback, is good enough that large firms seeking to diversify continue to snap up fluid power firms when they can get them, just as they have for the past five years.

Crane Co. organized a systems and controls group around a fluid-power subsidiary this year. American Brake Shoe Co. acquired a French fluid power builder. Textron, Inc., bought a defense business package built around a fluid-power producer.

Fluid power men themselves are making a record marketing effort. One company will hit the industrial market for the first time next month with a major campaign. Another company, specializing in the farm equipment market, will expand into materials handling, earth-moving, and industrial equipment components. Lear Inc., has licensed Lucas-Rotax, Ltd., to build Lear-designed units in Canada.

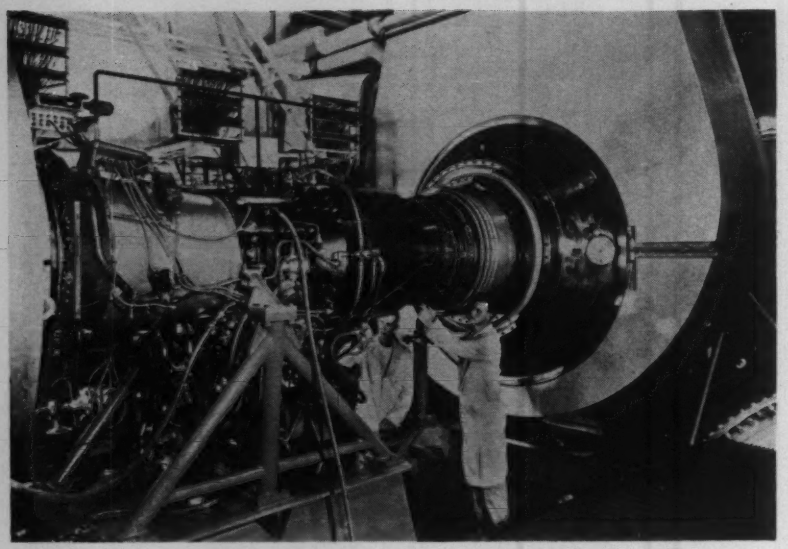
Sell a Package—And there's a growing tendency to sell complete fluid power systems, rather than components. Those who've tested the idea are enthusiastic.

The argument: Why depend on the dealer or customer to engineer a single component into a complete hydraulic system? Sell him the whole unit. It's all engineered. All that's needed is to bolt the completed unit on the product and it's ready to operate—whether to control a valve or position a machine tool bed.

Market Studies — Finally, fluid power men are beginning major market studies of their own industry. Parker-Hannifin is pioneering the division of sales districts into "trading area units."

This is one of the first moves in a wave of market studies now planned. Included in the attack are: (1) A census of manufacturers; (2) breakdown of products offered; (3) studies of top geographic market area; (4) fuller industry-wide statistics and forecasts.

What does a growth industry do in a bad business year? If fluid power is a case in point, it steps up R&D, boosts the sales force and distributorships, expands its product line, and catches up on the market studies it didn't have time for in the past.



TEST RUN: A new gas turbine, using an adapted J-57 aircraft jet engine, is now in operation at Columbia Gulf Transmission Co.'s Clementsville, Ky. works. It's lighter and requires less space than conventional units.

Industry Harnesses Jet Turbine Power

Columbia Gulf Transmission Co. recently announced operation of a new-type gas turbine.

It's using an adapted aircraft jet engine. Officials say it's lighter, more economical and needs less space.

■ Industry has harnessed aircraft jet thrust as a source of stationary power.

The move was made when a new type of gas turbine, using an adapted aircraft jet engine, went into operation near Clementsville, Ky. recently. The turbine, designed by the Cooper-Bessemer Corp., pumps about 600 million cu ft of natural gas daily in the pipeline compressor station of the Columbia Gulf Transmission Co.

This represents the first successful mating of an aircraft jet engine to industrial power needs.

Much Lighter—A revolutionary prime mover, the RT-248 gas turbine develops 10,500 rotative hp and weighs 34,000 lb. Its weight is about one-sixth that of a conventional gas turbine unit.

The powerplants are expected to find widespread use in the natural gas, petroleum and petrochemical industries, in electrical power generating and in marine applications.

A Pratt & Whitney Aircraft J-57 jet engine, adapted to run on natural gas, is used as the heat energy source for the unit. The turbine's light weight, with 10 to 1 compression ratio, requires no regenerating system.

Needs Less Space — Also, the RT-248, officials note, requires less than one-half the space of other units, relatively simple foundationing and lighter crane facilities.

De Soto Will Stay Despite Rumors

Despite reports to the contrary, Chrysler Corp. has not reached a decision on when it will end output of its De Soto line. But it is pretty certain the car will leave the medium-price class by the 1962 model year. However, the name is definitely staying on, a Chrysler source says.

De Soto is still included in production schedules through the first quarter of 1961. De Soto suppliers are tooling for 1962 parts. But the company is keeping an eye on sales on a day-to-day basis while production rolls along at 50 cars a day, five days a week.

October output was 944 against 2270 in the same month of 1959. Through mid-November, production of 1961 De Sotos was around 2500 units.

Steel Co. Battles Water Diversion

Diversion of Great Lakes water through the Chicago Sanitary Canal would seriously handicap steel production, two Great Lakes Steel Corp. executives told a Federal hearing on water diversion.

This position was stated by P. C. Vetter, vice president, engineering, and E. M. Doig, vice president, raw-materials.

They said a water level reduction of 1 in. would decrease cargo capacities to the point where four additional ships would be needed per year to keep normal deliveries coming into the mill. They also said reduction in the present water flow would add greatly to general costs as present water equipment would have to be changed.

They said they feared that a lower water level would be a safety hazard and endanger structures at the water front, too.

The testimony of the two executives and other witnesses will be used to determine whether Chicago's request for additional water diversion from the Great Lakes should be approved.

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A RADICALLY NEW METALLURGICAL APPROACH builds unprecendented durability into Heller "Ultras". That's why they're certain to outlast all high speed steel band saws currently used in production cut-off work on ferrous metals. **IMPROVED IN EVERY WAY!** Special steel analysis . . . more advanced production methods . . . closer heat-treating control . . . stronger welds . . . more exacting 100% inspection! No wonder Heller "Ultras" deliver up to 300% more cuts per blade. Yet, the price is only 10% higher. This means as much as 75% savings in cutting costs.

TESTS CONFIRM THEIR SUPERIORITY! Matched against all comers, at heavy feeds and higher speeds, the harder teeth, tougher bodies and more uniform full-blade flexibility of Heller "Ultras" are sure bets to win the race against time and costs. Seeing's believing!

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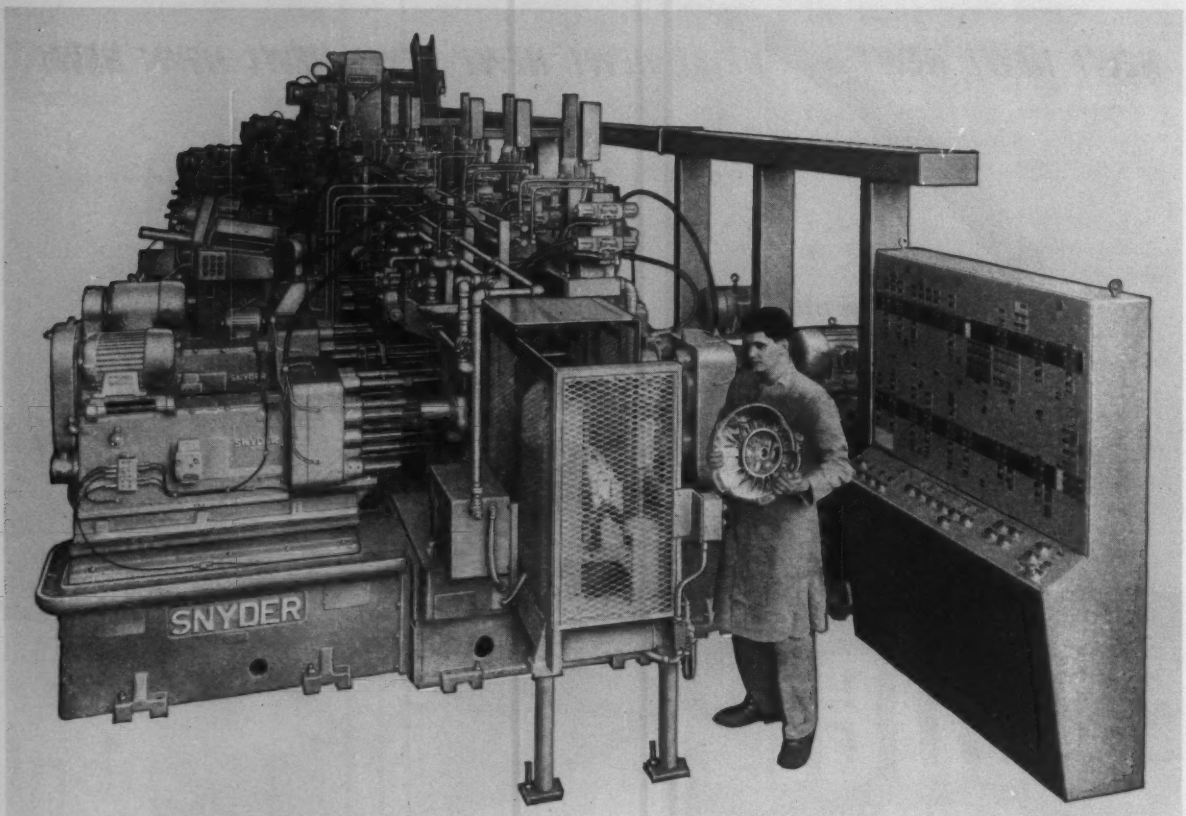

DIFFERENT SIZED PARTS INTERMIXED AT RANDOM ARE PROCESSED AUTOMATICALLY ON SNYDER SPECIAL 56-STATION TRANSFER

Here's another big Snyder special "building-block" transfer with a bit of extra versatility.

Specifications called for one sequence of operations on a big aluminum transmission cover case for domestic use and a different sequence on a smaller cover for export.

Schedules set a production rate of about four domestic units to one export unit but, for production convenience, the machine had to accept these parts intermixed at random and run them through automatically.

So, Snyder Engineering designed a "collar" which bolts to the smaller piece, bringing it up to locating and clamping dimensions of the larger piece. Lugs on the collar and workpiece control appropriate switches which by-pass certain operations. Parts are automatically positioned in process.

Operations include drilling, reaming, boring, tapping, chamfering, spotfacing, center holing, end milling, probing, air gaging, pressing in rectangular plug, pressing in bushing and a couple of washing operations.

Production is 150 parts an hour at 100% efficiency. Any of the 20 segments can easily be converted for comparable operations on other parts and the number of segments can be increased or reduced at any time. Your inquiries are invited.

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Real Growth: It's Impressive

There have been violent political arguments about how much and how fast the U. S. is growing.

But study of advances made in the past 14 years shows impressive, long-term gains.

■ Arguments about America's economic growth came hot and heavy during the election campaign.

But beyond the debates over how much and how fast the U. S. is growing, these facts stand out:

In the period since World War II, the country has made impressive, real gains in the standard of living. These gains hold up even when stripped of the artificial advance created by rising prices and increased taxes.

Adjusted for Inflation—How much the country has grown is pinpointed in Pittsburgh's Mellon National Bank analysis of President Eisenhower's last economic report. To show real gains, all dollar measures of production, income, and consumption were adjusted to eliminate the effects of higher prices.

Here's what the study revealed:

Since 1946, the total output of the economy (as measured by the Gross Nation Product) increased by more than 50 pct. In terms of 1959 prices, it advanced from $316 billion to $482 billion. Gains on a per capita basis were more than 20 pct.

Income Gains — Advances of about the same size were made in personal income (after taxes) and in spending. There was a 48 pct increase in total personal income after taxes. The personal income gain per capita was 18 pct. Weekly wages of production workers rose almost 40 pct, from $65.40 to $89.47.

More Goods—With these dollar gains, Americans moved to buy more and improve their standard of living. The number of families owning their own homes rose by more than 60 pct since 1947. Car ownership rose by 70 pct. Ownership of household appliances more than doubled.

For example, the number of homes with refrigerators increased 111 pct; those with vacuum cleaners by 124 pct; and those with electric washers by 126 pct.

. . . And Fuller Lives—All the gains made, however, were not in material items. Improvements came in more than the use of creature-comforts. Among the other areas where America moved ahead: Education, health, personal financial security, leisure, and recreation.

The number of those between 5 and 29 enrolled in school went up 13 pct. Money spent per pupil jumped 130 pct. Communicable diseases and industrial injuries dropped sharply.

Measures of personal security also showed tremendous increases. There was a big advance in the number of people covered by life insurance, Social Security, unemployment compensation, and medical insurance.

Business Optimism Increases

■ You'll find business optimism on the rise from now on.

Many businessmen believe the Kennedy Administration will stimulate activity. (See story on p. 105.)

There are additional reasons for encouragement. Some forces which operate to improve business are already at work.

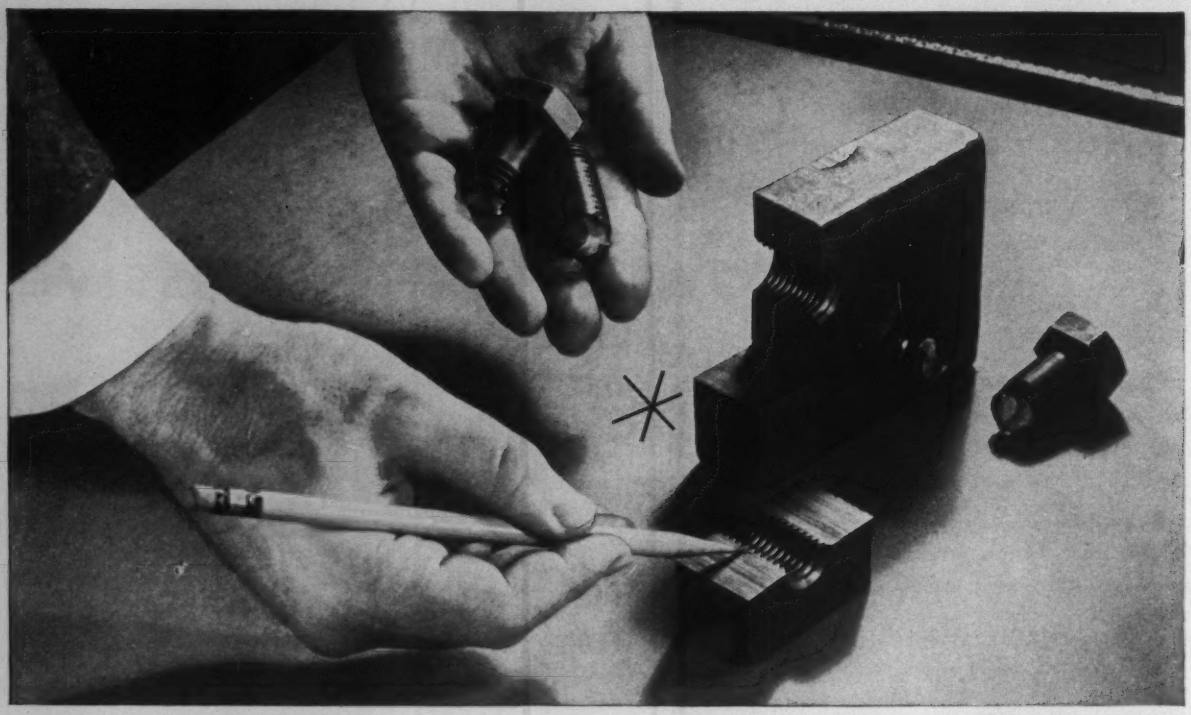
Inventory Runout—With business inventories pared to the bone, some upswing in buying is fairly sure. Even at present production rates, some manufacturers are getting into difficulties. Temporary shortages of raw materials result in shorter production runs, costly downtime, and delays in getting orders out. In such a situation, the desire to keep inventories low gets sidetracked.

Government Moves—The moves made to ease credit should also help business. Their impact, especially in the housing market, will increase in the months ahead.

Then there are the so-called automatic economic stabilizers—such as unemployment insurance and pension benefits. Other government moves to increase spending for public construction and defense could also help.

Business Moves — Finally there are the efforts business itself is making. Typical are decisions to push capital spending programs.

Many companies are at work overhauling marketing policies, doing more research to develop new products, advertising present ones, and re-training sales forces.



Showed way to save $7800

RB&W fastener survey of refrigeration unit suggested that hex screws be substituted for studs ...and castings be tapped with less costly clearance fit.

When there are no special design requirements or space clearance conditions, using studs of 1-inch diameter and smaller often penalizes the user needlessly. First, in direct costs, since the more economical *hex screws* will do the job. Second, in production costs, since studs require holes tapped with an expensive *interference* thread fit.

The RB&W Man pointed this out when his survey revealed over 250 stud fastenings per refrigeration unit. For this application, 250 hex screws cost $8.45 . . . for a saving of better than $22 over the studs and nuts. Annually this would total to $7800 . . . *clear profit.* And on top of this, reduced tapping costs, too.

Want to get the most from *your* fastener dollars? Ask for an RB&W man to make a survey. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W
116th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.

** Specifying studs for fear that hex screws might damage castings during disassemblies is based on a groundless fear. Hex screws in threaded holes with clearance fit can be reused repeatedly without damaging the casting. In the test casting shown above, the hex screws were first tightened and removed 50 times—then torqued to breaking point. Cutaway section showed casting threads were still perfect, with no sign of stripping.*

Guessing Isn't Good Enough

Scheduling Production Requires Advance Planning

Automobile production lines can't be turned on or off like a water faucet.

Planning starts months in advance. And the faucet is turned on a month before actual production.

By A. E. Fleming

■ Sales and production forecasting is risky in any business. But it's really hazardous in the auto industry. A miscalculation can mean the loss of millions of dollars due to, high inventory and obsolescence costs.

Practically every automaker overestimated the new car market late last summer. The result: A huge fall inventory of unsold 1960 models as the 1961 selling season began. It was the biggest carry over of old models ever. Doubtless, it is costing the industry plenty of money to unload at cutrate prices.

Plan Ahead — Considering the risks involved, how does an automaker go about figuring out the number of cars to ship to dealers in a given month? How far ahead does he plan production of these cars?

In the case of Chrysler Corp., production plans are locked up a month in advance. Commitments for parts are made two months ahead. And plans for raw materials purchases are made three, sometimes four, months ahead.

The way Chrysler planned December production is typical. To allow adequate lead time, early in October dealers told the company how many cars they believe they can sell in December. With the dealer forecasts in, the plan goes like this:

Oct. 14-16 — Production Programming & Control Staff gets domestic, Canadian and export sales needs from the Automotive Sales Group and Chrysler International.

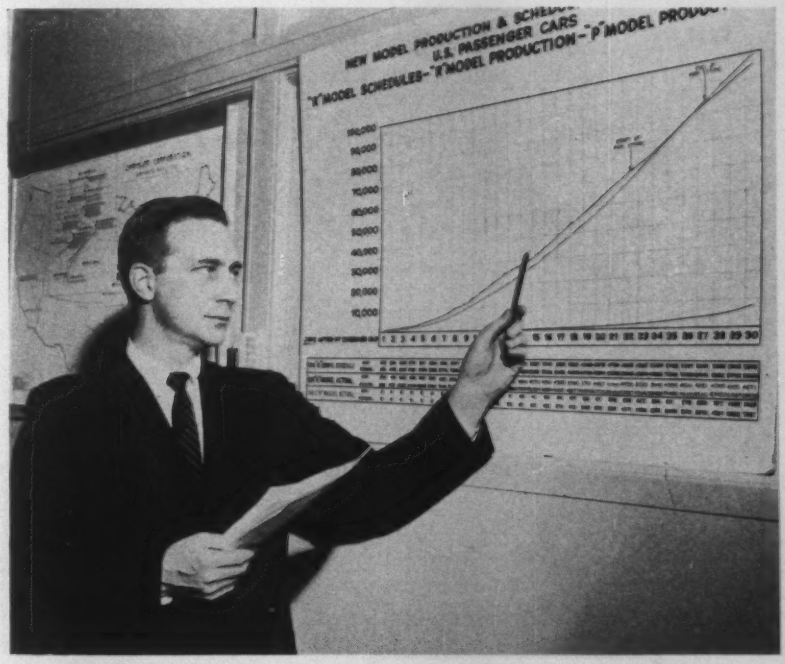
Oct. 17-22 — The program is broken down in detail by car line, body styles, major options, and assembly location.

Oct. 24-28 — The program is weighed against factors that might make it risky on the high or low side. These factors include the latest available market penetration figures, new car inventories, used car inventories, competitive data and various trends.

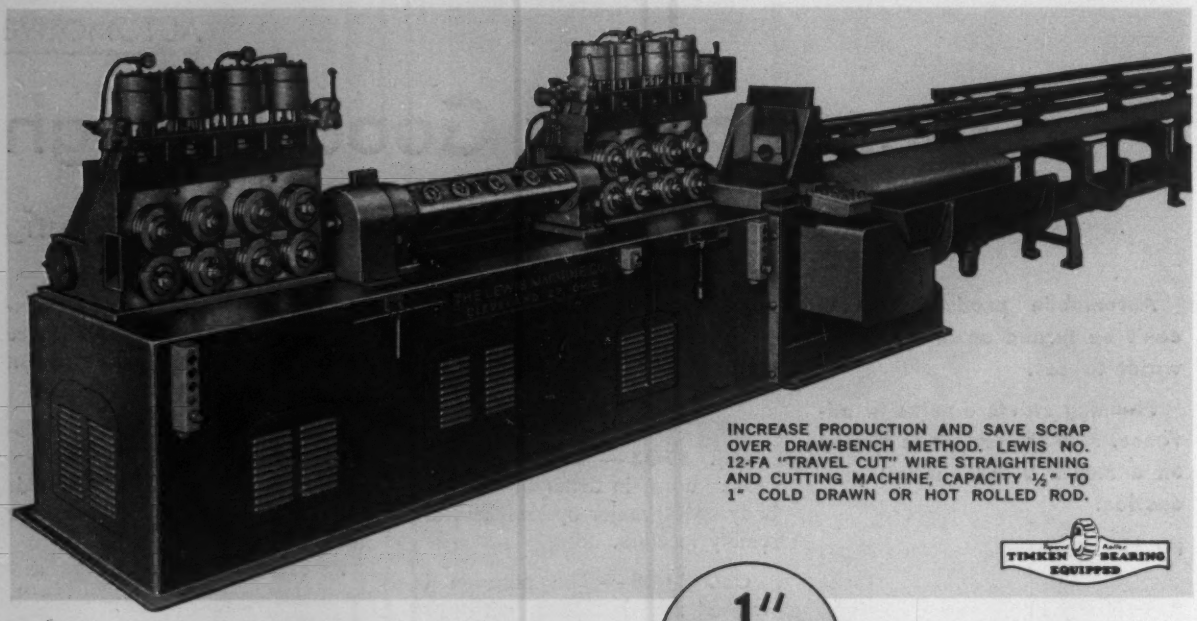
Oct. 29-31 — The Executive Scheduling Committee, composed of the corporation's first vice president and all group and staff vice presidents, is given the information to study for approval.

Nov. 1—The program is published and sent to everyone responsible for procurement of materials and production, distribution and marketing of new cars.

As each car making division and the assembly plants gets the schedules early in the month preceding production they send shipment and fabrication authorizations to Chrysler manufacturing plants and outside parts suppliers. Nearly 50,000 releases to suppliers go out committing the company for the fabrication, shipment and purchase of parts and raw materials.



STARTS EARLY: W. C. Childs, Chrysler's director of production programming, is a key link in the chain of events leading up to actual production of a car. He notifies suppliers when and where to ship materials and authorizes them to fabricate quantities of parts for advance needs.



INCREASE PRODUCTION AND SAVE SCRAP OVER DRAW-BENCH METHOD. LEWIS NO. 12-FA "TRAVEL CUT" WIRE STRAIGHTENING AND CUTTING MACHINE, CAPACITY ½" TO 1" COLD DRAWN OR HOT ROLLED ROD.

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Now...straighten and cut 1" dia. rod FROM COILS at speeds up to 350 fpm.

HERE'S WHY IT CAN BE DONE

CUT-OFF Flying Shear Type. Pure crank motion for both cutting and traveling permitting high speeds with minimum shock.

ROTARY ARBOR Two-speed with dual-center straightening dies for faster, more accurate straightening over a wide range.

ROLL HOUSINGS Dual-range pushbutton operated pneumatic feed pressure for exact feed control and coil end pull-through without twisting.

LENGTH GAUGING Light pressure on electric trip switch actuates air clutch. Wire is gauged and released with positive moving mechanism . . . springs and latches have been eliminated.

TRANSMISSION Positive sliding-gear type with eight feed speeds — 115 to 350 FPM.

Write for Brochure. Other models available to handle rounds from .012" to 1" dia. Shapes from 1/16 to 5/8" square, hex and flats.

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Farwest: Cautious but Expanding

Even With Gloom Talk, New Companies Still Increase

Businessmen on the West Coast are cautious about expressing optimism.

Nevertheless, industry is still expanding and the list of new companies continues to grow.

By R. R. Kay

■ Caution is the general business mood on the West Coast. In fact, gloom talk dampens optimism.

But businessmen with stout hearts and confidence in the future keep expanding and building new plants.

And there's more to the expansion story. The variety of products made and assembled in the region keeps widening. This means a stronger base in the Coast's economy.

Here are some new and expanding companies who are in the market for metalworking's goods and services. They're all in California.

Tools for Aerospace—Burg Tool Manufacturing Co., Gardena—machine tools. Chemical Milling International Corp., El Segundo—chemical milling for aerospace industry. Centra Cast Co., Inc., Santa Clara—ferrous and nonferrous castings.

Hufford Div. of Siegler Corp., El Segundo—machine tools, aerospace parts, ground support equipment. Avionic Structures, Inc., Anaheim—sheet metal shop. L. C. Murray Machine Shop, South El Monte—drop forge dies.

Shower Doors and Auto Parts—Fiat Metal Manufacturing Co., City of Industry—metal shower doors, cabinets, toilet partitions. Plasticon, Inc., El Monte—reinforced plastic parts for automotive, aviation, and marine industries.

Walton Tool & Die Co., Inc., Burbank—sheet metal and machine shop. Del Manufacturing Div. of Arrowhead & Puritas Waters, Inc., Los Angeles—parts for aerospace industry. Harrison Manufacturing Co., Burbank—metal seals.

Ampco Metal, Inc., Huntington Park—aluminum, bronze, copper materials. Gemco, Inc., Los Angeles—aircraft ejection and separation systems, bomb racks, wing pylons.

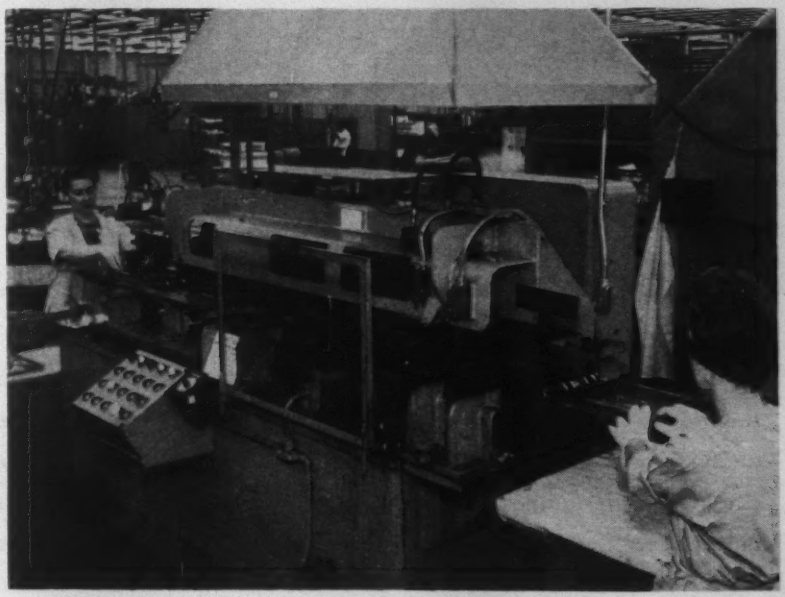
Electronic Parts—Millions of dollars still pour into facilities for makers of electronic and electrical equipment. Here's who's getting bigger, and what they make:

Controls Div. of Leach Corp., Azusa—industrial-military controls. Elpac, Inc., Fullerton—capacitors. Acor, Inc., Van Nuys—connectors. Microdot, Inc., South Pasadena—connectors, transformers.

Servo Component Div. of Giannini Controls Corp., Glendale—potentiometers, servo motors. General Transistor Corp., Los Angeles—data processing equipment. Pacific Electro Magnetics Co., Inc., Palo Alto—tape recorders.

On The Beam—Military & Industrial Electronics Div. of Magnavox Co., Torrance — research laboratories in fields of communications, navigation, data processing. Autonetics Div. of North American Aviation, Inc., Anaheim — electronic systems and components.

It Reduces Cost, Increases Reliability



FINAL STEP: Operator at left loads a universal holding rack containing etched circuit board assemblies into an automatic dip solder machine. Completed boards are unloaded at right. This is final step in new automated technique developed at Convair Div., General Dynamics Corp.

Pre-Engineering by **KAISER ENGINEERS** answers basic plant expansion questions...

Raw Materials?

Your final decision to expand or build results from a series of important individual decisions. Raw material availability is one of them. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. In addition, KE designs and builds for the Steel industry... offers skilled experience in all types of facilities from raw material plants to finishing mills. Whatever your requirements... from Pre-Engineering analyses through plant design and construction... Kaiser Engineers brings world-wide experience and ingenuity to their solution.

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6231-S

Use of Numerical Control Lags

Much Interest, Few Orders Result from Tool Show

Big volume industries shy away from numerically controlled tools. Most interest is shown in simpler dial units.

High cost is viewed as a big drawback. And adapting tools doesn't always work.

By R. H. Eshelman

■ Why haven't numerically controlled tools caught on in a big way? Isn't industry ready for them yet? These are questions arising from the machine tool exposition, and discussed with considerable warmth around the corridors during the recent annual meeting of the tool builder's assn.

Some builders of standard lines feel numerical control stole the spotlight at the show. But this emphasis is far from being realized in past or present orders. These builders point out there are few numerically controlled machines in the big volume industries. None of these machines have reached the production floor of the automobile plants as yet, for instance.

Compromise Choice—One exhibitor demonstrated a tape machine, a dial-in type, and a standard machine all in a row. He reports most interest is on the simpler—and far less expensive—dial unit. It's a compromise, more automatic than the standard, less so than full tape control. But it seems to hit the right key on the cash register.

Some skeptics of N-C point to the high cost, usually more than double the standard machine. They add, however, this is no barrier in the aerospace industry, where government funds are often available for capital equipment. A large percentage of tape machines have gone into this field.

TAPE MAKES CHIPS: Bridge type profile and contour milling machine developed specifically for numerical control operation by Cincinnati Milling makes chips fast in die-sinking operation.

So it's no surprise that as a matter of hard dollars, the question of adapting existing machines to tape control keeps popping up. It did at the exhibition with several kits offered for price tags at slightly above $5,000. But this choice, too, can be filled with pitfalls.

Adapting Tools — Cincinnati Milling Machine Co., which builds tape-controlled machines as well as standards, takes note some of these pitfalls in a recent comment. "The (numerically controlled) machine must have special qualifications to follow instructions without benefit of a skilled operator," explain their engineers.

The qualifications noted include servo-mechanisms, elimination of backlash in slide drive mechanism, elimination of friction in drives, etc.

"It's obvious that even the best of present-day machine tools are usually not prepared to be equipped with numerical controls," they add. "Adapting existing machines is an extremely costly operation to both the manufacturer who does the job and to the customer. Chances of a satisfactory performance are rather remote." That seems to rule out this seeming easy answer.

INDUSTRIAL BRIEFS

Rx for Condenser Tubes—Chase Brass & Copper Co., a subsidiary of Kennecott Copper Co. Waterbury, Conn., has established a Condenser Tube Clinic. The newly-formed clinic will work with various companies on analysis of water tube failures, corrosion problems and metallurgy.

Borrowed on Time—A new leasing program has been formed, enabling manufacturers to lease any of the complete line of automatic high production machinery made by The Baird Machine Co. The leasing arrangement has been established between The Baird Machine Co., Stratford, Conn., and the Equitable Leasing Corp. of New York City.

English Crane—Crane Ltd., London, a subsidiary of Crane Co., purchased Rhodes, Brydon & Youatt, Ltd., manufacturers of a broad line of centrifugal pumps. Manufacturing facilities are located at Stockport, Cheshire, England, in a modern plant completed in April, 1960. The company's products are marketed under the trade name MOPUMP.

In Name Only—Stauffer-Temescal Co. has changed its name to Stauffer Metals Co. On Jan. 1, 1961, the wholly owned subsidiary will become a division of the parent, Stauffer Chemical Co. Stauffer Metals also retains sole rights to sell and license electron beam melting and casting furnaces under some thirty patents and patent applications.

Midwest Branch—Posen & Kline Tube Co., subsidiary of Handy & Harman, has opened a Midwest branch office at 1900 W. Kinzie St., Chicago 22, Ill. Posen & Kline products include close-tolerance stainless steel and nickel-alloy tubing in both seamless and redrawn welded types.

It's Yttrium—With the cutting of an yttrium metal ribbon on Oct. 13, 1960, J. A. McCone, chairman of the U. S. Atomic Energy Commission, dedicated the new Metals Process Development Building at Ames, Ia. The building is a $1.9 million addition to AEC's Ames Laboratory. The lab is operated for the USAEC as one of its major facilities by Iowa State University through its Institute for Atomic Research.

Spreading Cement—U. S. Steel Corp.'s Universal Atlas Cement Div., has secured options on three sites for cement distributing stations along the East Coast. The sites selected are at Norfolk, Va., and Jacksonville and Port Canaveral, Fla. Locations at other coastal points are also under consideration.

Short Course—A short course in quality control by statistical methods will be presented at the Univ. of Illinois, Urbana, Ill., Jan. 30-Feb. 9, 1961. Intensive work will be given in the fields of control charts, acceptance sampling, and related topics. The course is designed for those in the areas of design, production, procurement, management, quality control and inspection.

Buckeye Bound — Clearing, a Div. of U. S. Industries, Inc., plans to manufacture its complete lathe line in its Hamilton, O., facilities. Previously, this operation was carried on at Clearing's Chicago plant. All other selling services including engineering, sales, and advertising will be located at the Hamilton plant.

Around the Bay—A new direct factory warehouse to service Bay Area users of industrial fasteners has been opened in San Francisco by Russell, Burdsall & Ward Bolt & Nut Co. Located at 1700 Bancraft Ave. (5600 N. Third St.), the new warehouse building will contain 1000 tons of stock and a complete inventory of fastener products for fast delivery to industrial users.

Conveyor Manufacturers Elect Officers

NEW FOR 1961: New officers for Conveyor Equipment Manufacturers Assn. are: (Front row, left to right) president, E. H. Woodberry, Lamson Corp.; director, Orlan A. Johnson, Gifford-Wood Co.; vice president, George H. Woodland, Chain Belt Co.; secretary, E. L. Weinthaler, Conveyor Systems, Inc.; (back row) director, H. A. Barber, Barber-Green Co.; director, L. E. Brill, The Jeffrey Manufacturing Co.; treasurer, H. E. Murken, Hewitt-Robins Inc.; executive vice president, R. C. Sollengerger.

Mrs. Jayne B. Spain, Alvey-Ferguson Co. (not shown), was also elected as a director.

AGAIN-

Revere helps "fit the metal to the job"

AND A COMMUTATOR MANUFACTURER SAVES ON BOTH MATERIAL COSTS AND OVERALL COSTS WHILE PRODUCING A SUPERIOR PRODUCT

The hub of the small commutator you see above originally was made of a ferrous metal. Certain problems cropped up due to the fact that the rod from which the hubs were fabricated, not only had to be drilled, but it also had to be able to withstand a flanging operation. The engineering department of Dayton Precision Manufacturing Company called in one of Revere's Technical Advisors for consultation.

After a thorough study of the problem Revere Brass Rod of a certain alloy was recommended and samples were furnished. The machinability of the rod was found to be outstanding, being readily and speedily drilled. Also it withstood the flanging operation . . . a set of manufacturing conditions where only brass, the right kind of brass, outshines all other metals and alloys.

Final score: The low first cost of the brass rod, plus its superior machinability, resulted in a more satisfactory product without the penalty of higher costs. A further advantage to the manufacturer was the added sales appeal of the brass hub.

And there you have another example of how Revere in collaboration with the manufacturer helped, "fit the metal to the job," which resulted in a better part at the least possible cost. Why don't you take advantage of this kind of service?

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Ave., New York 17, N. Y.

Sales Offices in Principal Cities. Mills: Rome, N. Y.; Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles, Riverside and Santa Ana, Calif.; New Bedford and Plymouth, Mass.; Brooklyn, N.Y.; Newport, Ark.; Ft. Calhoun, Neb.

Distributors Everywhere.

Forging Ohio Rolls

to shape metal for all Industry

. . . this 2,500 ton forging press, now in operation at the Lima plant, is the latest member of Ohio Steel's family of roll producing equipment.

The giant manipulator, overhead crane, and banks of the latest in car type, natural gas-fired furnaces, with automatic program controls, complete this new forging facility—A modern facility with which to produce Ohio Forged Steel Rolls and Forged Steel Sleeves for back-up rolls.

The Ohio Steel Foundry Co.

LIMA, OHIO ... *Virtually at the center of the steel industry*

PLANTS AT LIMA AND SPRINGFIELD, OHIO

OHIO IRON AND STEEL ROLLS

Carbon Steel Rolls
Ohioloy Rolls
Ohioloy "K" Rolls
Flintuff Rolls
Double-Pour Rolls
Chilled Iron Rolls
Denso Iron Rolls
Nickel Grain Rolls
Special Iron Rolls
Nicloy Rolls
Forged Steel Rolls
Forged Steel Sleeves for Back-Up Rolls

J. A. Marohn, named financial vice president, Acme Steel Co.

Joy Manufacturing Co.—**R. F. Stewart,** elected a vice president of the company and general manager of the Western Precipitation Div., Los Angeles.

Rea Magnet Wire Co., Inc., Div. of Aluminum Co. of America—**R. L. Whearley,** elected president; **A. C. Sheldon,** executive vice president; **I. M. Belcher,** secretary-treasurer; and **G. T. Cook,** comptroller and asst. secretary-treasurer; **J. L. McKinley,** becomes vice president, sales.

Sommerfeld Machine Co., Inc.—**E. J. Skeehan,** appointed asst. vice president.

Nuclear Corp. of America—**W. H. Bailey,** appointed executive vice president.

Clearing Div., U. S. Industries, Inc.—**W. H. Stout,** appointed vice president and comptroller; **T. F. Nelson,** appointed director, labor relations; **J. W. Rayner,** appointed personnel director; **V. C. Kranz,** appointed sales engineer, Chicago area.

Haynes Stellite Co., Div. of Union Carbide Corp.—**C. G. Chisholm,** appointed vice president, marketing.

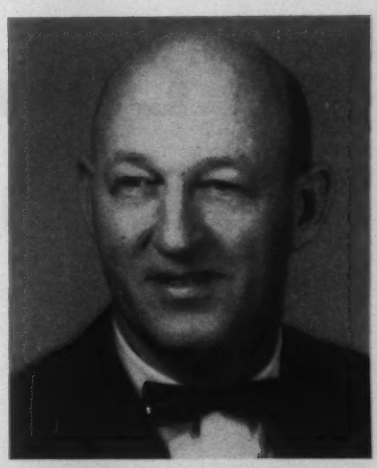
Metal Stamping Div., Ford Motor Co.—**K. N. Krecke,** appointed manufacturing manager, stamping plants.

The Barden Corp. — **P. R. Roehm,** elected executive vice president.

Detroit Div., Solar Steel Corp.—**H. D. Curtis,** appointed asst. manager.

Cincinnati Milling Products Div., The Cincinnati Milling Machine Co.—**G. E. Parker,** appointed asst. sales manager.

The Timken Roller Bearing Co.—**A. L. Christenson,** promoted to asst. to the general manager, Steel and Tube operations.



J. E. Eckert, appointed vice president, engineering, The Waterbury Farrel Foundry & Machine Co.

Rolling Mill Div., The Waterbury Farrel Foundry & Machine Co.—**A. J. Beck,** appointed chief engineer; **W. J. Litalien,** appointed purchasing agent.

U. S. Steel Corp., American Bridge Div.—**H. P. McAnally,** appointed manager, Elmira Plant.

Sales Div., Kaiser Steel Corp.—**T. H. Wakeman,** named manager, plate, structural and bar sales, Oakland, Calif.; **J. H. Webber,** pro-

(Continued on P. 130)

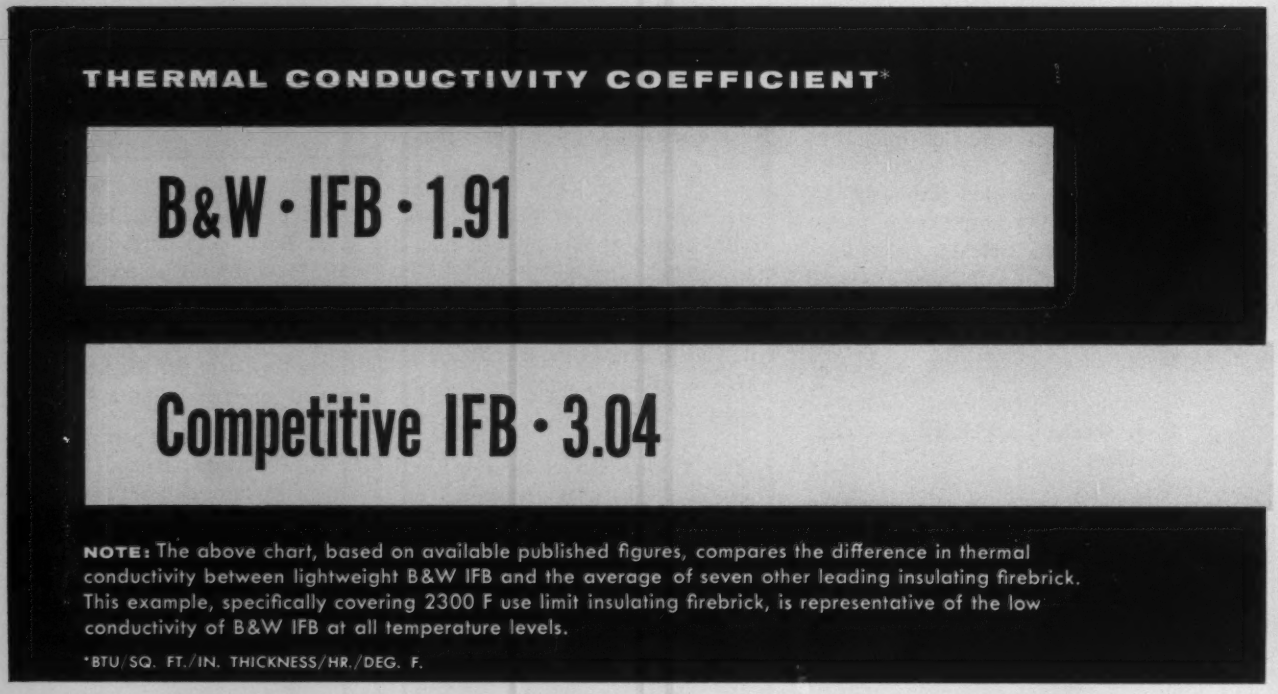
R. R. Bush, elected a sales vice president, Meter & Valve Div., Rockwell Manufacturing Co.

A. C. Thornton, elected vice president—personnel, The Yale & Towne Manufacturing Co.

G. T. Pfifer, appointed vice president—asst. to the president, E. W. Bliss Co.

Another *plus* of Lightweight B&W Insulating Firebrick

LOWER THERMAL CONDUCTIVITY means



NOTE: The above chart, based on available published figures, compares the difference in thermal conductivity between lightweight B&W IFB and the average of seven other leading insulating firebrick. This example, specifically covering 2300 F use limit insulating firebrick, is representative of the low conductivity of B&W IFB at all temperature levels.

*BTU/SQ. FT./IN. THICKNESS/HR./DEG. F.

All insulating firebrick are not the same. Published figures show wide variations in *all* of the important properties among the leading brands of IFB.

Take thermal conductivity. This important property affects fuel costs, temperature control and the speed with which a furnace heats and cools. Thermal conductivities range from a B&W low of 1.91 to a high of 3.47 for a competitive IFB—*almost a 100% difference in wasted heat and fuel costs.*

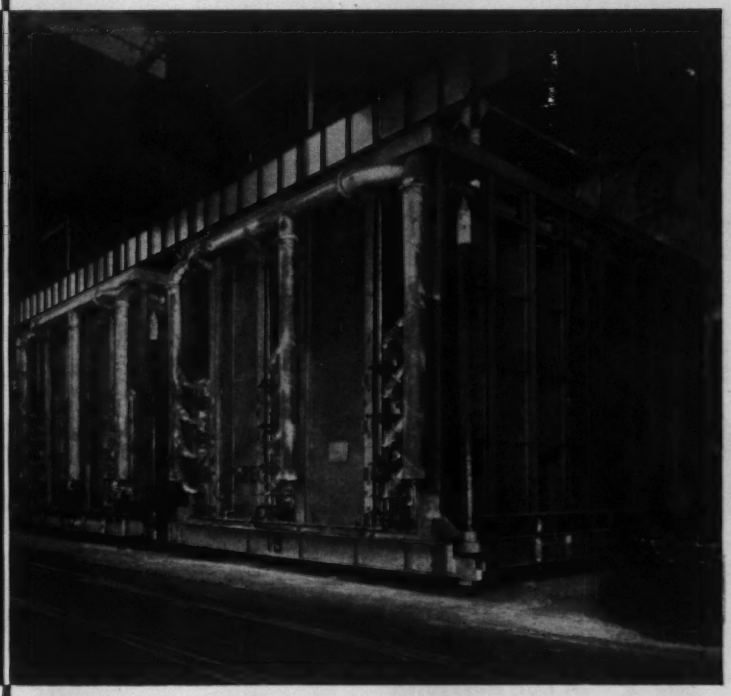
You are paying for insulating firebrick . . . make sure you get *all* the benefits. B&W—the originator of IFB—manufactures a full line of IFB with an experience-proved balance of light weight, high insulating value, high strength and long life.

For complete information on B&W Insulating Firebrick, write for Catalog R-2-H to The Babcock & Wilcox Company, Refractories Division, 161 East 42nd Street, New York 17, N. Y.

NUMBER 1 OF A SERIES

LOWER FUEL COSTS

the payoff



- **14% lower fuel costs • 30 F lower casing temperature**
- **25% less time to reach operating temperature • 12 hours saved per cycle**

These are the results of a direct comparison of two furnaces of the type shown above, one lined with B&W IFB and the other with one of the better competitive insulating firebrick. That's how B&W pays off for a major steel company in their 8-stack, hood type, strip annealing furnaces. This is just one of many proofs in our files that "there is an important difference in insulating firebrick."

R-858

B&W

THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

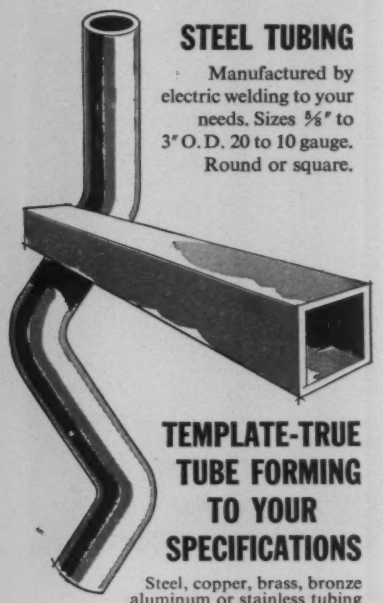
NOW
TWO
FORMED
TUBES
PLANTS
to serve you

1. Sturgis, Michigan

In heart of metal working industry.
Seven large truck line terminals.
New York Central and
Pennsylvania Railroads.

2. Haleyville, Alabama

Convenient to Birmingham.
On U. S. Highway 278.
Southern and Illinois Central Railroads.



STEEL TUBING

Manufactured by electric welding to your needs. Sizes ⅝" to 3" O.D. 20 to 10 gauge. Round or square.

TEMPLATE-TRUE TUBE FORMING TO YOUR SPECIFICATIONS

Steel, copper, brass, bronze aluminum or stainless tubing fabricated to your specifications. Sizes ⅜" to 6" OD, 20 to 10 gauge.
Thirty-four years of experience in forming, welding, beading, bending, stamping of formed tubes.
Top-flight engineering service.

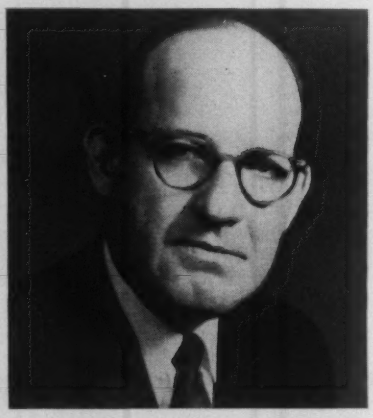
Write, wire or phone for booklet or quotation.
Formed Tubes, Inc.
1106 Prairie Street, Sturgis, Michigan

Formed Tubes, INC.

(Continued from P. 127)

moted to Mid-Continent district sales manager, headquartered at Tulsa, Okla.

Dodge Manufacturing Corp.—**F. J. Ebeling,** named director, sales.

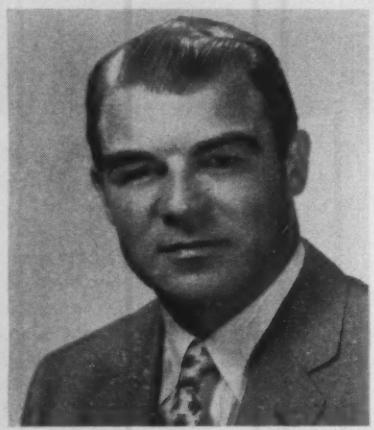


C. W. Elston, named general manager, Large Steam Turbine-Generator Dept., Schenectady. N. Y., General Electric Co.

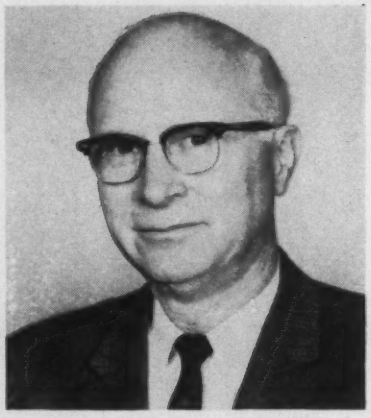
Allied Chemical's General Chemical Div.—**O. G. Direnga,** named director, research administration; **W. G. King, Jr.,** named director, planning research; **C. D. Boyer, Jr.,** named asst. director.

Mackintosh - Hemphill Div., E. W. Bliss Co.—**M. P. Orr,** appointed general sales manager.

Advanced Management and Methods Div., Sun Oil Co.—**M. P. Nelson,** appointed asst. director.



F. W. Smith, appointed vice president and general manager, Penn Machine Co., Johnstown, Pa.



A. L. Spurlock, named vice president and general manager, Leukart Machine Co., Columbus, O.

West Coast Div., Arwood Corp.—**Norman Silverberg,** appointed sales manager.

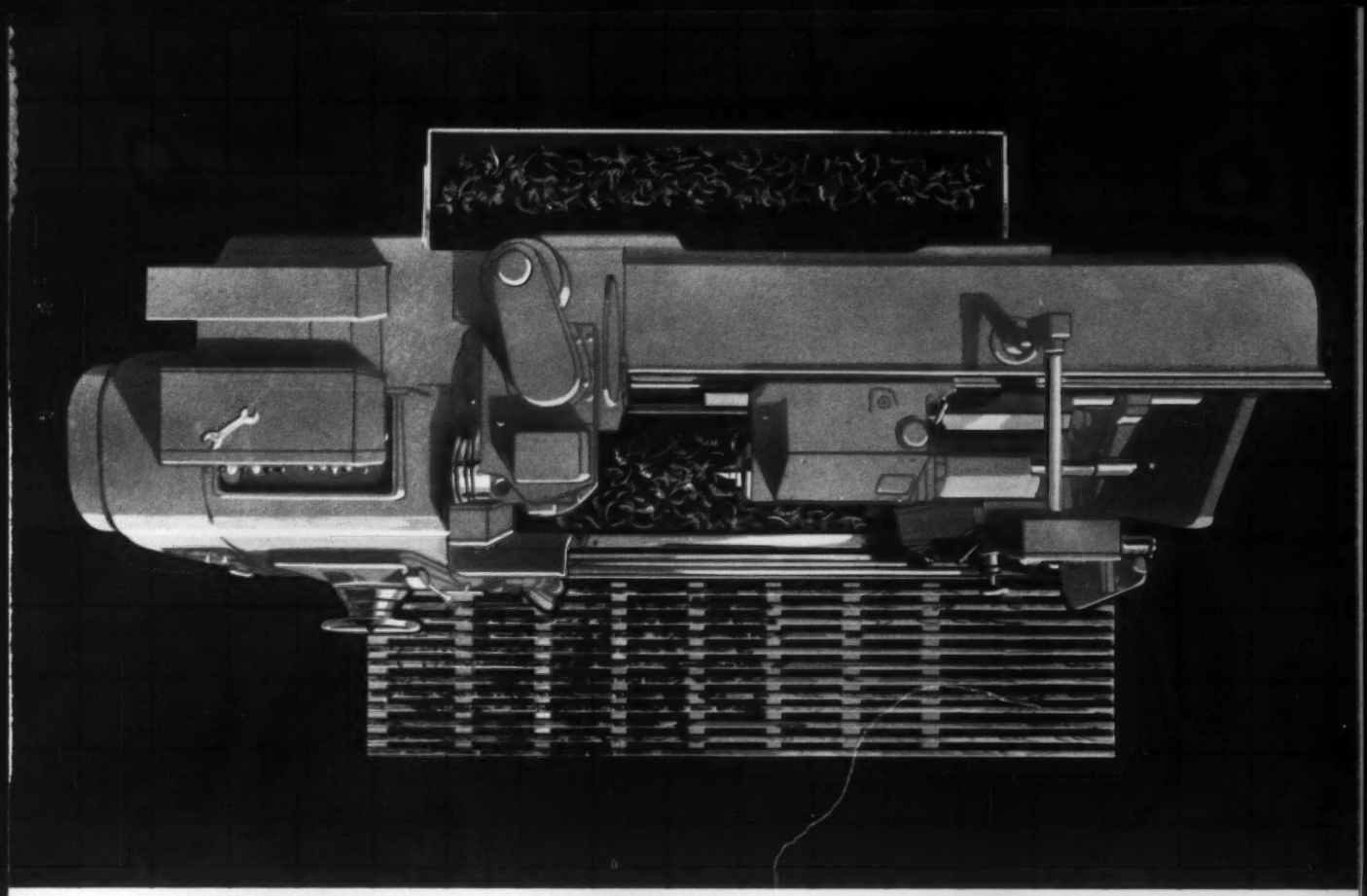
Climax Molybdenum Co., Div. of American Metal Climax, Inc.—**C. R. DeBevoise,** appointed manager, market research.

Quaker State Metals Co., Div. of Howe Sound Co.—**J. F. Scott** and **C. V. Wren,** appointed sales representatives, mill products.

E. N. Nelson, appointed product manager, carbon and coated strip steels, Youngstown, O., plant, Stainless and Strip Div., Jones & Laughlin Steel Corp.

Driver-Harris Co.—**K. H. Hobbie,** appointed director, marketing; **W. P. Smith,** appointed sales manager; **Charles Phayre** and **Edwin**

(Continued on P. 134)



You can turn a profit on a New Britain +GF+ Copying Lathe

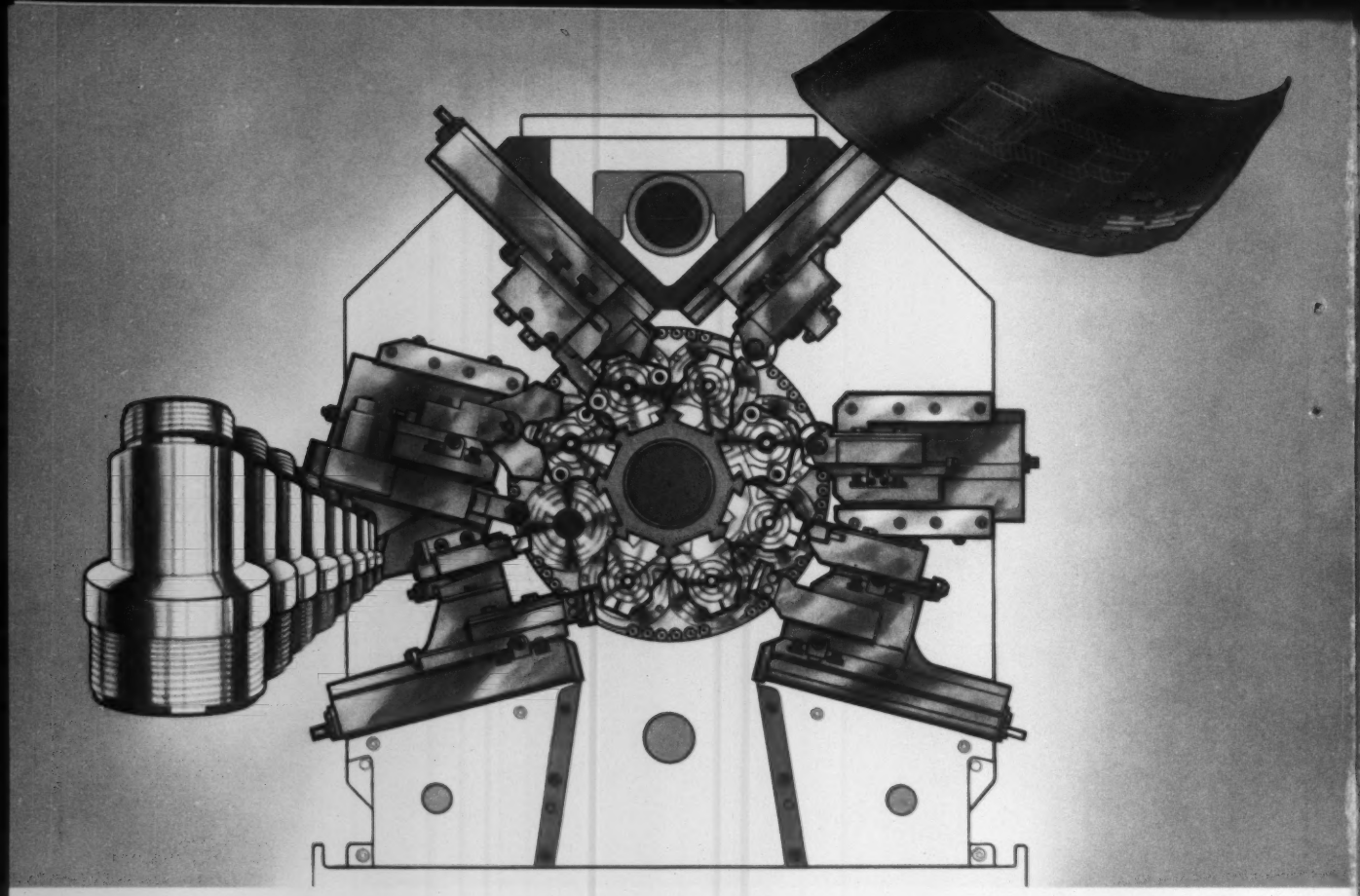
Here's a birdseye view of a New Britain **+GF+** Copying Lathe. It shows some important differences between this machine and conventional lathes with copying attachments. The point here is this—*the most effective use of the single-tool copy-turning principle can be made only with a machine designed from the ground up for this type of work.* The New Britain **+GF+** is just such a machine. Notice the chip pan. It's big (it has to be) and located for easy removal of chips from the back of the machine. The design of the work area allows for unobstructed free-fall of chips out of the way and into the pan.

The New Britain **+GF+** is massive and rugged, with plenty of power—up to 40 h.p., if you need it. It's simple to operate, quick to set up and change over. The single-point tool can be changed in one minute and it out-produces gang tooling setups in the bargain. Turning is controlled by either a template or a prototype. External and internal copying are accomplished in one set-up with special tooling.

The possibilities for short or long run chucked and between centers work on the **+GF+** are wide and varied. Because the work is produced with good surface finish and dimensional accuracy, grinding can be reduced and, in some instances, eliminated. Large diameters are broken down economically by successive parallel cuts, automatically if desired, with optional two-cut or multi-cut recycling.

You've got to see one of these machines in action to fully understand the kind and quantity of work they are capable of producing. Contact your New Britain Representative for demonstration arrangements or write The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division - New Britain, Connecticut



Unlimited tooling combinations with New Britain Bar Machines

Nothing can out-date your operation quicker than better machines in the hands of a competitor. In the race to keep ahead on quality, price and delivery, nothing can put you out front faster than machines capable of consistently producing the highest quantity of finished pieces at the lowest possible cost. New Britain's new series of bar machines represents in every way the most advanced bar-turning units available. Each of the four-, six- and eight-spindle models has been redesigned, adding new features and improving older ones. Unlimited cross slide and end-working tool combinations, extremely fast operation (even on stainless) and a variety of models and features to choose from add up to some good reasons for incorporating New Britains into your replacement or production expansion plans.

The eight-spindle model is the largest, most modern eight-spindle bar machine available. It has a stock capacity of up to 2⅝" and provides six independently-operated cross slides. As with all New Britain bar machines, the operations of the cross slides and end-working tool slide are disc-cam controlled for positive actuation, close tolerance machining and easy, rapid change-overs.

This is only a very small part of a story that is bound to interest you. The whole story and its significance in terms of your profits is available from your New Britain Representative. If you prefer, contact us directly at The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division - New Britain, Connecticut

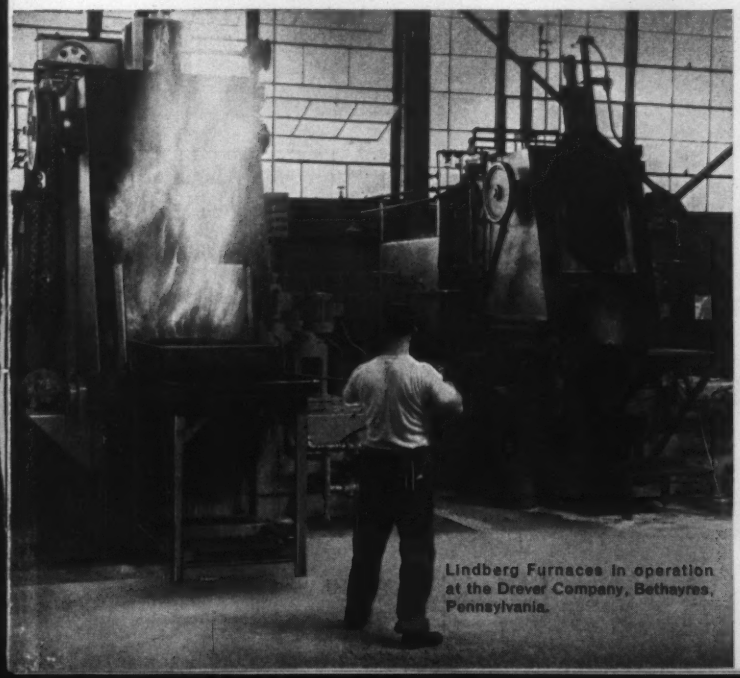
What HORACE DREVER has to say about Lindberg heat treating equipment

Mr. Horace Drever, internationally prominent in the industrial heating field, is a Past-President of the Furnace Manufacturers Association and President of Drever Company, furnace manufacturers and commercial heat treaters.

QUOTE from Mr. Drever's unsolicited letter to Lindberg Engineering Company

"For the past three and one-half years, we have been operating one of your Type 243618 GVRT Furnaces along with a 500 CFH Lindberg Hyen generator in our commercial heat treating division. We are extremely pleased, not only with the fine quality of work turned out by this equipment but also its relatively trouble-free operation. As evidence of our complete satisfaction we have ordered another Lindberg Furnace of this type."

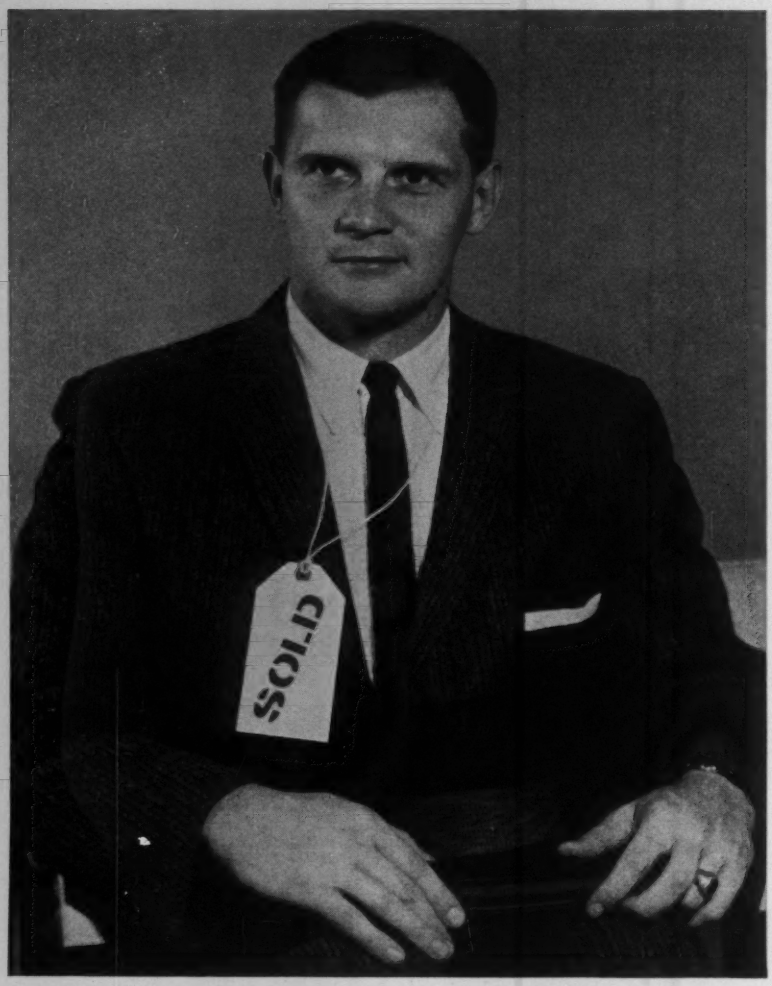
DREVER COMPANY



Lindberg Furnaces in operation at the Drever Company, Bethayres, Pennsylvania.

We are happy that Mr. Drever, a furnace manufacturer in his own right, originally chose Lindberg equipment for his heat treating plant and that its satisfactory service prompted an additional order. The second Lindberg Furnace is now in production at Drever Company, as the adjacent photo shows. Bless those satisfied customers! If you have a product or process in the metal or ceramic field requiring the application of heat you can depend on Lindberg's engineering and design know-how to provide exactly the right equipment to answer your need. Get in touch with your nearest Lindberg Field Representative (see classified phone book) or write direct to Lindberg Engineering Company, 2452 West Hubbard Street, Chicago 12, Illinois. Los Angeles plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.

LINDBERG
heat for industry



WITH EVERY WHITING INSTALLATION!

You purchase the close, personal interest of your Whiting engineer when you invest in a Whiting cupola or mechanical charging system.

Whiting engineering includes preliminary planning and pre-installation testing as well as every phase of installation. Whiting engineers make post-installation checks, too, assuring production quality and control that have made "Whiting" synonymous with profitable, trouble-free operation.

For experienced pre-planning—and accurate cost estimating—you'll find a Whiting engineer at the other end of your phone.

FREE: Bulletin FY-179, *Mechanical Charging Systems.* Write Whiting Corporation, 15601 Lathrop Avenue, Harvey, Illinois. In Canada: Whiting Corporation (Canada) Ltd., 350 Alexander Street, Welland, Ontario, Canada.

90 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

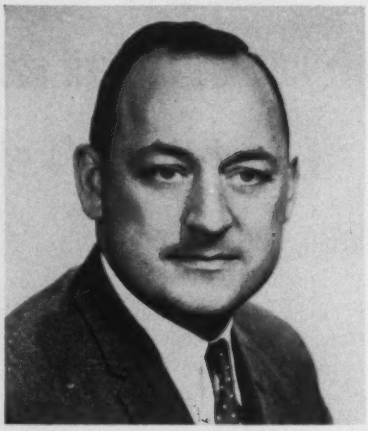
WHITING

MANUFACTURERS OF CRANES; TRAMBEAM® HANDLING SYSTEMS; PRESSURE GRIP; TRACKMOBILES;® FOUNDRY, RAILROAD, AND SWENSON CHEMICAL EQUIPMENT

RAILROAD EQUIPMENT

(Continued from P. 127)

Shuttleworth, appointed asst. sales managers; **M. P. Leimbach,** appointed manager, Chicago office; **R. J. Pastine,** appointed manager, Detroit office, at Birmingham, Mich.



F. F. Ward, appointed vice president, Arrow Tool Co., Inc., Wethersfield, Conn.

Edward Weissman, appointed vice president and general manager, The Jacobson Nut Mfg. Corp., Kenilworth, N. J.

Lafayette Steel & Aluminum Corp.—**R. A. Ruth,** appointed manager, sales.

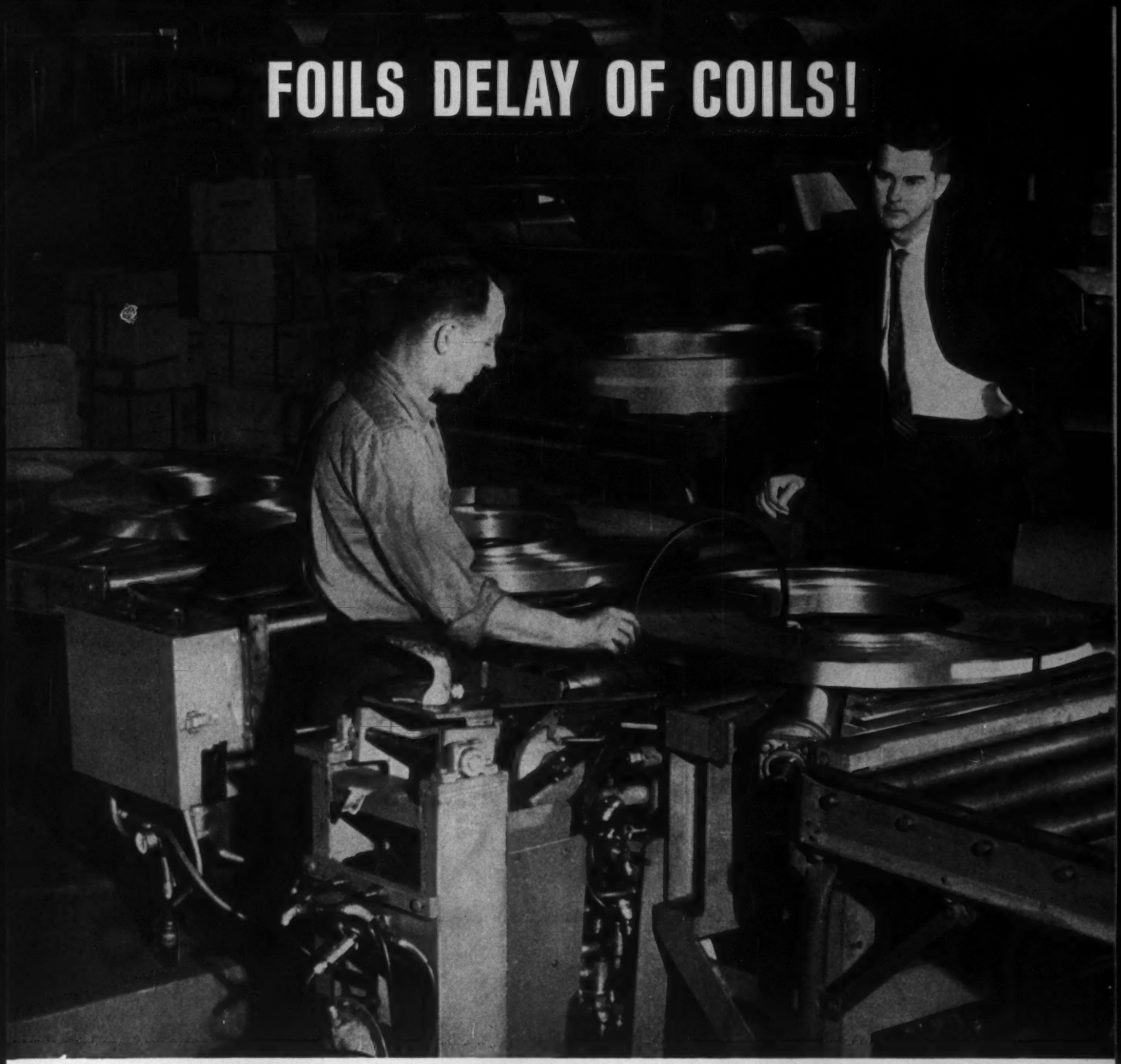
Hanson - Van Winkle - Munning Co.—**G. M. Herring,** appointed asst. sales manager.

OBITUARIES

W. B. Carter, 48, general manager, The Penco Div., Alan Wood Steel Co.

Arthur Lehr, president, Bliss & Laughlin, Inc.

FOILS DELAY OF COILS!



Acme Idea Man Gene Fairbank (right) suggested Idea No. S4-12 to United Flat Rolled Products, Chicago.

United Flat Rolled Products, Chicago, beat bottlenecks in slit coil production with a conveyorized Acme Steel F4 Strapping Machine—and tripled production capacity in the process!

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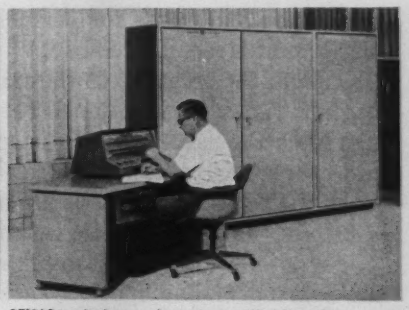

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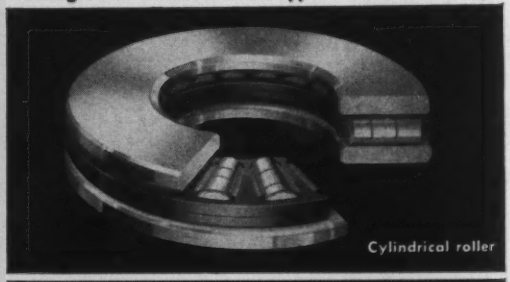
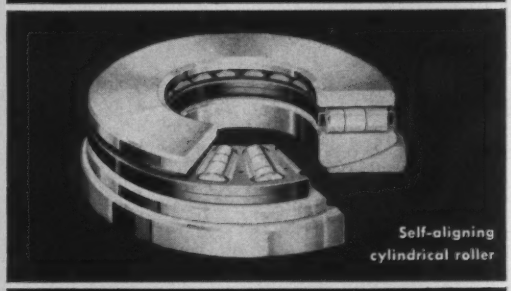
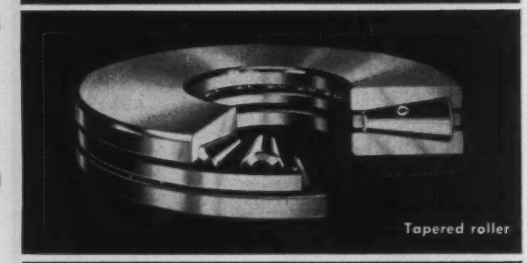
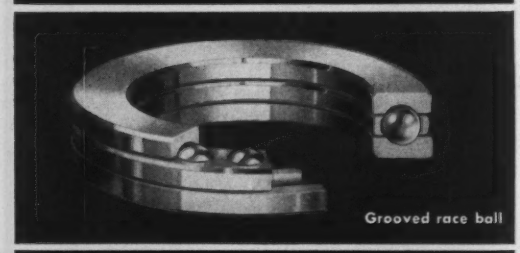
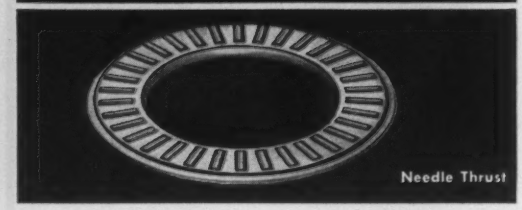

Cylindrical roller


Self-aligning cylindrical roller


Tapered roller


Grooved race ball

Angular contact ball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Spend More for Missiles

President-elect Kennedy plans to throw "sufficient" extra money into the U. S. space program to make it "adequate." Kennedy has continually said the U. S. can "do better" in the space race. Specifically, he pledged to send Congress a plan to speed Polaris and other missile programs. It's expected that space spending will reach $2 billion by the end of the four-year term.

Casts Forging Dies

Aircraft forgings, in long thin sections, can be produced with a minimum of costly and time-consuming machining. How? Special dies, developed to take 80,000 psi at 1600°F, can be cast with cavities needing no machining. Casting molds, made of special graphite mixtures, give excellent surfaces, close tolerances, fine grain size, and good internal soundness of die.

How Many in Space?

Since Word War II, no less than 337 U. S. missile projects have been started. So reports the Assoc. of Missile & Rocket Industries. In addition to missiles, the index includes 343 other projects in the rocket and space field. These include: satellites, space vehicles, power, propellants and new guidance systems.

Flight Time Pays Off

More than 10-million manhr have been put into the Atlas' test-flight program in the last four years. W. W. White of Convair Astronautics revealed at the American Management Assoc. meeting in New York, that this heavy emphasis on testing has been a prime factor in the missile's high-reliability and success. The Atlas missile performed well in about 85 pct of the 55 R & D flights that took place at the Cape since 1957.

Costs More Than "Bird"

The Army Corps of Engineers is wondering when the people who count—top Pentagon officials, congressmen, and prime contractors—will fully realize the importance of ground support equipment. The Corps, which handles missile ground support for both the Army and Air Force, bases its case on this fact: Ground support accounts for 78 pct of the cost of missile launching. Corps officials point out that the "bird" is a small expense compared to ground support.

Simulates Space Flight

Republic Aviation Corp. plans to start building a $750,000 hypersonic wind tunnel. The new facility will allow company scientists to study re-entry and flight patterns under actual flight conditions. Studies will include hypersonic aircraft and such space vehicles as Dynasoar and the Mercury capsule as well as ballistic missiles.

Tests 100 Miles High

Perfecting new space-age metals takes special facilities. Towards this end, General Vacuum Corp. will build what will probably be the largest vacuum furnace. It'll be used for high-temperature processing of high-strength metals under controlled ultrapure conditions. Temperatures in the 1-ft diam, 2-ft high heat zone will go up to 4500°F. The vacuum will be in the range of 1×10^{-6} mm, equivalent to an altitude more than 100 miles above the earth.

Shocks Metal Framework

Shocks, caused by sudden stops and starts, can be duplicated by a new dynamic-loading instrument. The Dynapak-type device applies millions of pounds of force in a fraction of a second. One major use for it is to test rocket motor mounts. Both rocket ignition and flameout subject the framework to enormous stresses.

Why Ceramics Fracture

Fracture of ceramics is the subject of a new research program at Armour Research Foundation. Researchers will determine why and how ceramic materials fail, and what methods can be developed to improve their reliability. According to N. A. Weil, program project manager, the study will be mainly concerned with metal oxides.

Seventy-ton ladle takes molten iron from Whiting continuous hot blast cupolas and pours it into converters.

It's Foxboro control for giant new Acme steel plant

Hot Blast Cupolas have capacity of 50 tons per hr. – operate continuously

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Furnaces, cupolas, preheaters — you'll find Foxboro instruments help operate them all more efficiently. Ask your nearby Foxboro Field Engineer for recommendations for your plant. Or write direct for a copy of Bulletin 13-18. The Foxboro Company, 8011 Neponset Ave., Foxboro, Massachusetts.

Small-case Foxboro Consotrol* instruments (foreground) record and control preheater pressures, temperatures, flows. Preheaters were designed by Fabricating Engineering Co., Inc. *Reg. U. S. Pat. Off.*

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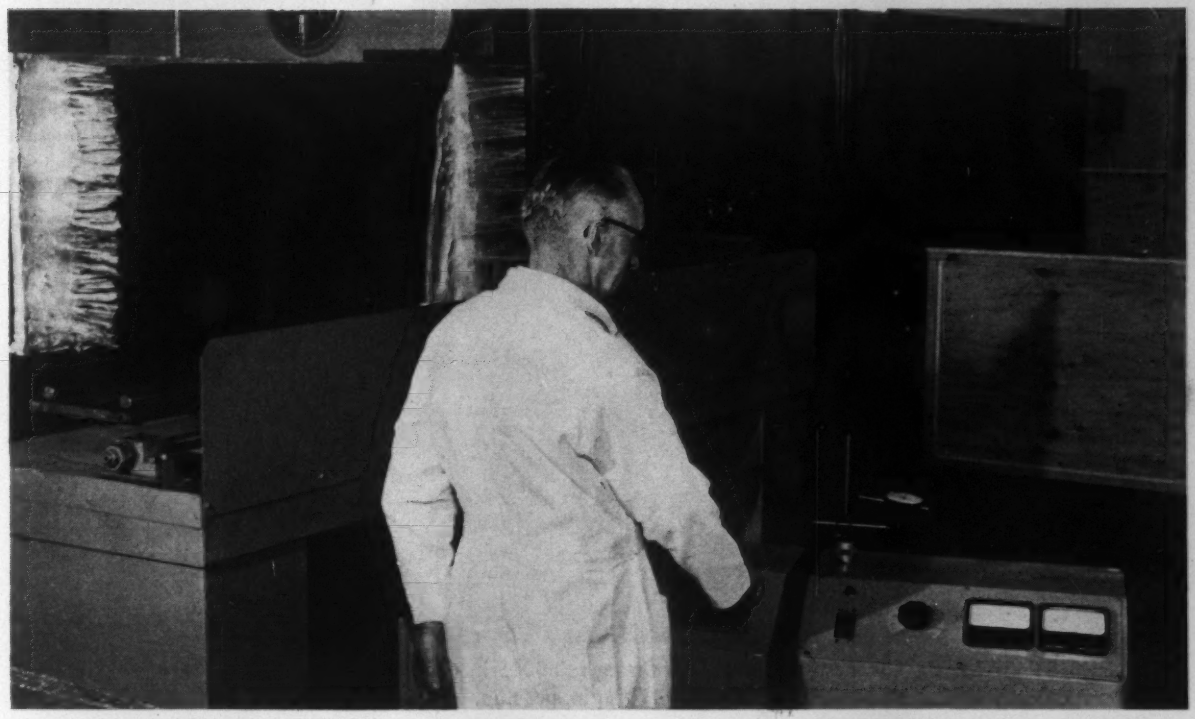


NEW APPROACH TO MACHINING: Quenched arc cutting is designed to machine fragile sections of stainless, zirconium and titanium. In many cases, the new process can even handle aluminum in honeycomb form.

Machine Makes Smooth Cuts In Honeycomb Materials

The growing use of honeycomb as structural material puts big demands on new machining methods.

An electric arc now moves into this cutting field. It's fast and accurate.

■ With typical pioneer spirit, a fabricator of honeycomb structures has been willing to try new approaches that others predicted could not be done. In the case of band machine slabbing, the company, The Dynacor Corp., Gardena, Calif., has not only succeeded but provided a major breakthrough.

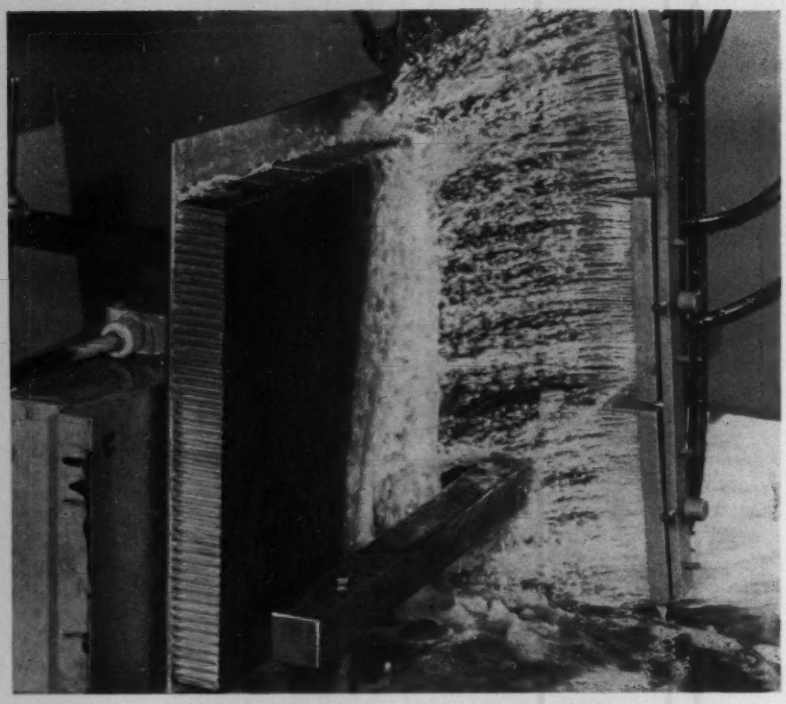
It's a new machine that is cutting slabs from all sizes of commonly used logs. The benefits are threefold: faster speed, better accuracy and reduced waste.

The unit is called an Electro-Band machine, a product of The DoAll Co., Des Plaines, Ill. The machine's cutting tool is not a toothed band. Instead, it is a smooth band of steel. The process involved is known as quenched-arc cutting.

Arc Cutting—How does it work? A low-voltage, high-current passes from the cutting tool to the workpiece within a flood of coolant. The arcing that results disintegrates the metal just ahead of the cutting tool. The coolant removes the heat from the operation, so the material adjacent to the cut isn't harmed.

For these reasons, high-speed cutting can be applied to very thin, delicate structures without leaving burrs. As a result, the technique will cut through stainless steel, zirconium, titanium and, in many instances, aluminum. At Dynacor, Electro-Band machining concentrates mostly on such stainless alloys as PH 15-7 Mo and 17-7 PH.

At present, DoAll makes three sizes of machines. Dynacor uses the



HANDLES STAINLESS: The new machine cuts through 0.0015-in. PH 17-7 Mo stainless foil (Condition A) at a rate up to 170 sq in. per min.

one recommended for slabbing and rough machining of honeycomb. This same machine can also be used to section radiator and heat exchanger cores. A larger unit is intended for finish machining of honeycomb, while the third unit is restricted to missile work, and experimental and small parts.

The First Unit—Dynacor's first unit consists of a 24-in. work height machine with a 40- x 44-in. work table and a 43-in. travel. The machine is so constructed that the cutting tool is at opposite polarity from the work table.

Honeycomb material to be cut is fastened to an angle plate. This is generally done by brazing. As such, the material and the table have the same electrical potential. Because the forces involved in Electro-Band machining are very small, the angle plate and other tooling can be quite light. In addition, accuracy will not be impaired.

Feed rate must be uniform and carefully regulated to achieve the results that Dynacor reports. The table travels on ball bushings and is driven hydraulically. The feed rate is infinitely variable from zero to 8 fpm.

The high rate is used for rapid traverse during return strokes and to ease setup. The actual cutting rate depends on the material, its size and the accuracy needed. On stainless honeycomb, Dynacor reports cutting rates of 200 sq in. per min for most work.

Steel Band—A 5-hp motor powers the steel cutting band through a positive drive at 6000 fpm. The energizer is rated at 7½ kw. Its output is infinitely variable between 6 and 24 v.

Obviously, the coolant plays a vital role in the quenched-arc process. Coolant capacity is 55 gal, a large enough amount to supply fresh, cool fluid for producing a clean burr-free surface.

A burr-free surface is vital in honeycomb fabrication. Honeycomb is generally brazed to sheet metal. The smoother the surface of the core material, the stronger the brazed joint.

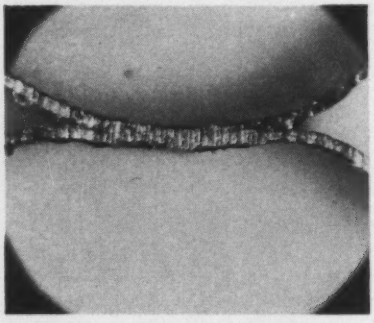
Proper Balance—When all factors are properly balanced, the resulting finish in quenched-arc cutting is equivalent to that produced by grinding. Cutting rate is quite high for finely finished work (5-50 sq in. per min). It's even higher (150-200 sq in. per min) where finish of the foil edge is less critical.

The flatness of the surface generated by Electro-Band machining ranges from ± 0.003 in. TIR at the lower cutting rate to $\pm 1/64$ in. TIR at the maximum rate of cut.

Research into new machining methods is conducted at Continental Machines, Inc., where the DoAll machine tools are made. Although this is purely the quest for better understanding of machining phenomena, a practical use was quickly apparent in the case of quenched-arc cutting.

From this early research came the new line of Electro-Band machines. What is this process? Perhaps it's better to state what it is not. For instance, it is not electrolytic sawing nor spark erosion. It does not employ the electrolytic machining principle. It does not use cutting fluid as an electrolyte.

Band Saw—As the name implies, Electro-Band machining is an extension of the band sawing technique. In so doing, the process makes the most of the high-speed cutting and low material waste inherent in band sawing. The band actually slices away honeycomb core in such a manner that only 1/32 in. of material is left as waste.



BRAZING AID: Cross section of 0.0015-in. foil shows a flat right angle edge with sharp corners. It's ideal for brazing. (X 50).

Because hand feeding isn't practical, even the smallest Electro-Band machine is equipped with a power feed table. This permits precise adjustment to the rate required by the geometry of the workpiece and the voltage applied.

No Stress—Since the actual cutting is done by an electric arc, neither the work nor the cutting band is subjected to stresses that occur in sawing, grinding or milling. The fixture only has to be strong enough to hold the workpiece vertically without deflecting under the weight of the work.

Each of the new units contains a fixed speed band machine, power supply and recirculating coolant system. An ammeter and a voltmeter on the column permit accurate monitoring throughout the operation.

The smallest of the three machines is rated at 5 kw. It has a 16-in. throat, 12-in. work height and operates at 550 fpm band speed using a 3-hp drive. This unit can handle bands up to ½ in. wide and wire up to 0.085 in. diam. Its table has 12-in. traverse with variable speed rates up to 3 fpm. Rapid traverse for positioning and setup is 12 fpm.

Middle Unit—The medium size machine has 7½-kw power supply. Its throat depth is 35 in., work height 24 in. and its table traverse is 43 in. Band speed is 6000 fpm. Wire size begins at 0.050 in. Feed rate is variable up to 8 fpm.

The largest of the Electro-Band machines has a throat depth of 26 in., work height of 48 in. and a table travel of 48 in. The power supply is 10 kw. The tool capacity is from 0.050 in. diam wire to 1-in. wide band.

The big unit is operated from a control console.

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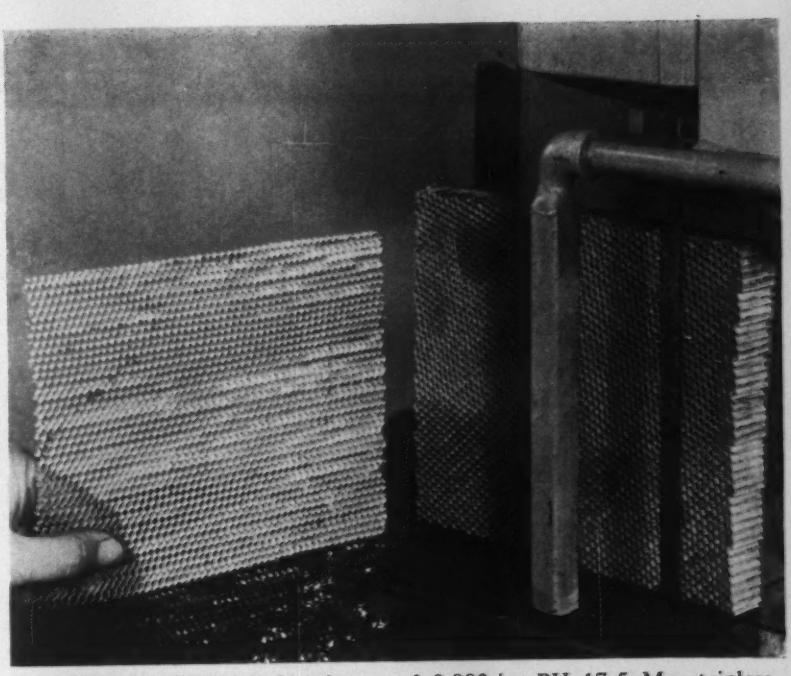
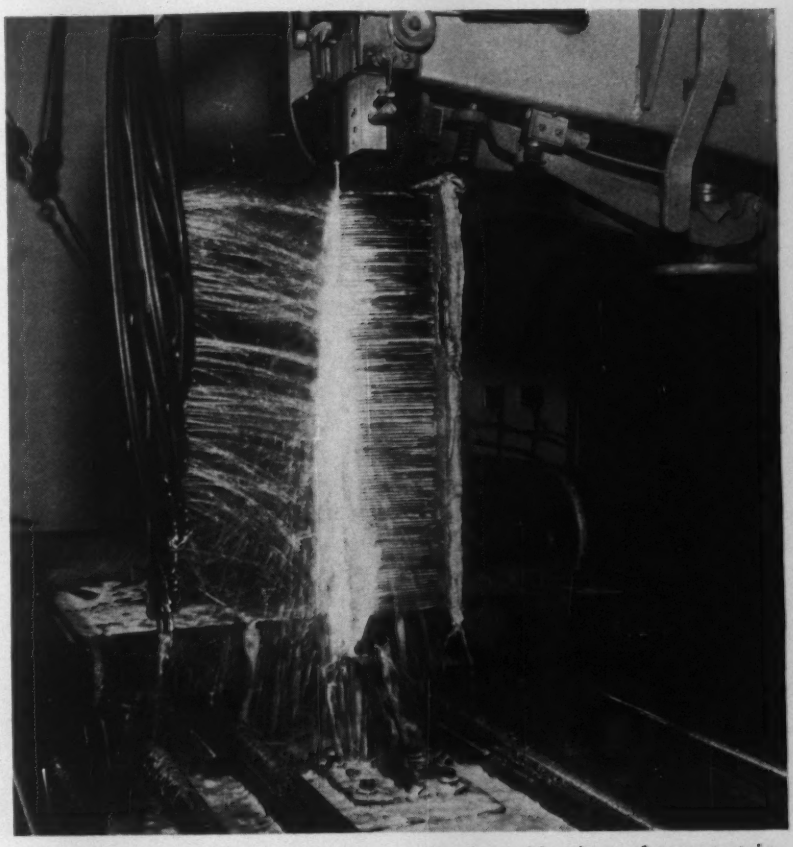


FREE OF BURRS: Machined area of 0.003-in. PH 17-5 Mo stainless-steel foil is free of burrs. It is also flat within ±0.003 in. per in.



FROM LOGS TO SLABS: An Electro-Band machine is used to cut stainless steel honeycomb logs into slabs, a difficult feat by conventional means.

Research Digs Deeper Into Annealed Nodular Iron

By **R. C. Bates**—Materials Engrg. Depts., Westinghouse Electric Corp., E. Pittsburgh

Annealed nodular iron is fairly easy to machine, but is it heat treatable?

Research came up with some useful answers to solve a production problem.

▪ Although nodular cast iron has found wide acceptance among designers, its use can be greatly extended by heat treatment. This is true because a wide range of hardness and strengths can be obtained by quench hardening or normalizing.

Even heavy sections respond to hardening treatments since the hardenability of nodular iron is on a par with AISI 4140 alloy steel. Heat treatment, however, has generally been applied only to the as-cast material.

One application for heat-treated nodular iron is in levers used in switchgear apparatus. To provide wear resistance at contact surfaces, these areas are locally hardened by heat treatment.

Massive Carbide — Very often, thin sections of the as-cast material contain large amounts of massive carbide in the microstructure. When machining is required, excessive tool wear results. Sometimes the carbide is so heavy that tools require reconditioning after machining only one lever.

These machining problems can be eliminated by switching to annealed iron because the annealing treatment decomposes the massive carbide. The added cost of annealing would, in most cases, be more than offset by the savings in machining costs.

But will annealed nodular iron respond to heat treatment? The ferritic matrix of the annealed material contains only negligible amounts of carbon. Without carbon, hardness cannot be increased by heat treating.

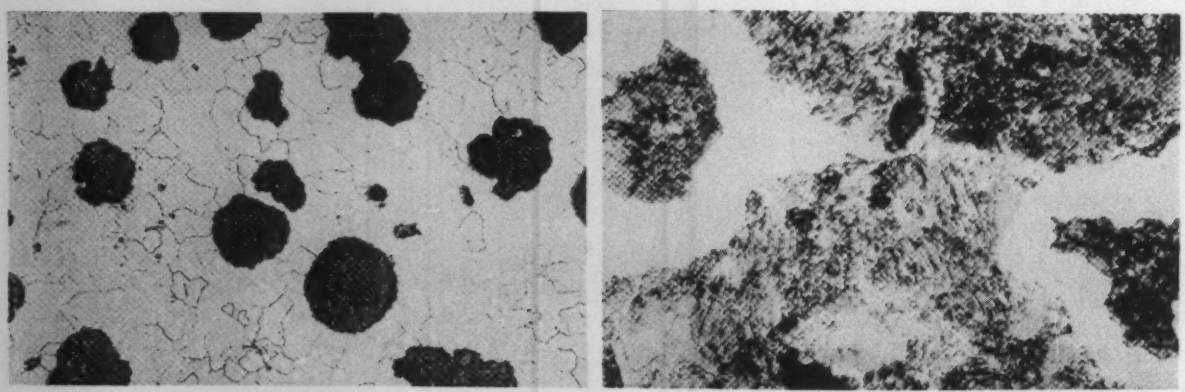
Carbon Diffusion—During austenitizing, can enough carbon be diffused from the graphite nodules into the matrix? A recent study at the Materials Laboratories looked into this problem. The study also included a comparison of the response of the annealed and as-cast grades to both quench hardening and normalizing heat treatments.

Austenitizing time and the effect of tempering were studied using test blocks from four electric furnace heats. Also, applicability of localized hardening of annealed nodular iron was determined. One test block was used in the as-cast state.

The other samples received a graphitizing - ferritizing annealing treatment. They were held for four hours at 1650°F, furnace cooled at 60°F per hour, and then air cooled to room temperature.

Close Control—Throughout the study, the austenitizing temperature was held at 1600°F ± 15°F. The effect of time at the austenitizing temperature prior to water quenching was studied in both the as-cast and annealed samples. Austenitizing times ranged from two minutes to one hour.

A salt bath was used for heating. The samples were small enough



FERRITE VS. PEARLITE: Annealed nodular iron (left) contains spherical graphite particles embedded in ferrite matrix. As-cast material, on the other hand, consists mainly of lamellar pearlite.

that the time required for heating to the austenitizing range was negligible.

According to hardness measurements and metallographic tests, annealed nodular iron responds to austenitizing at nearly the same rate as as-cast material. Austenitizing the annealed material for only two minutes prior to water quenching produced a matrix of 35 pct martensite and 65 pct ferrite. Ten minutes at temperature produced a fully-martensitic matrix in both the as-cast and annealed samples.

Annealed samples from three of the heats were fully hardened by austenitizing for one hour at 1600°F and by oil quenching. The effect of tempering for one hour in the 350°-1300°F range revealed that noted amounts of spheroidization occurred only in the samples tempered at 1100°F or higher. However, hardness decreased as temperature increased over the entire range.

Further Heating—Both samples were normalized by heating for one hour at 1600°F followed by air cooling. The hardness was about 98 Rb. The microstructure was pearlitic. After tempering these samples for one hour in the 350°-1100°F range, few changes were noted either in microstructure or hardness.

A slight drop in hardness was noted by tempering for one hour at 1200°F. A tempering temperature of 1300°F was needed to produce a fully-spheroidized structure. Its hardness was 88 Rb.

The aforementioned levers should only be hardened locally at areas subjected to wear such as contact surfaces. By doing this, the rest of the casting retains its maximum toughness. To determine whether the hardening action could be restricted to local areas, a lever was partly immersed in a salt bath for 30 minutes at 1600°F and oil quenched.

Hardened and Tough—Tempering for one hour at 350°F followed. Hardness of the immersed portion of the casting was Rc 51 and it extended only ⅛ in. beyond the immersion level. Beyond this point, hardness dropped off rapidly, and just ½ in. beyond the same level no hardening had occurred.

When steel parts are used in severe wear jobs, they're usually hardened to 60 Rc. Nodular iron (hardened to 50-55 Rc) is just as satisfactory if not superior to steel of like hardness for wear applications.

Use Oil—The studies pointed up that oil rather than water should be used as a quenching medium for all parts except those of large section size and simple design. Water quenching may cause cracking because of the high hardenability of this material.

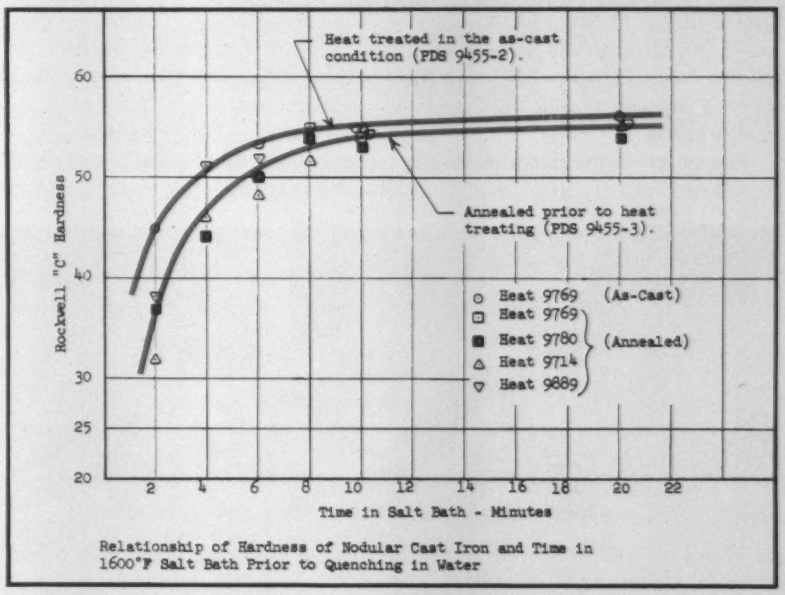
During the study, an austenitizing time of only 10 minutes prior to quenching was sufficient to produce a fully-hardened structure. More time is needed in production.

Time Affects Microstructure

Time In Salt Bath, Minutes	Rockwell "C" Hardness					Ferrite In Microstructure, pct
	Heat 9769*	Heat 9769	Heat 9780	Heat 9714	Heat 9889	
2	45	—	37	32	38	30 – 35
4	—	—	44	46	51	12 – 15
6	53	—	50	48	52	5 – 8
8	—	—	54	52	55	1 – 3
10	56	54	53	55	54	0
20	55	54	54	55	55	0
40	56	56	—	—	—	0
60	57	55	—	—	—	0
120	57	55	—	—	—	0

* This heat was in as-cast condition. All other heats were annealed.

Hardens in Fast Cycle



Relationship of Hardness of Nodular Cast Iron and Time in 1600°F Salt Bath Prior to Quenching in Water

Hard Coat Anodizing Rectifier Adds Control to the Cycle

Just how important is the rectifier in hard coat anodizing? Here's a missile maker now doing its own work, thanks to a new machine.

It affords a greater degree of control with big savings.

■ One of the largest hard coat anodizing systems in the country was recently installed at Douglas Aircraft Co., Charlotte, N. C. The huge 77-acre Douglas plant is owned by the U. S. Army. It is devoted primarily to the manufacture of the Nike Hercules missile, the Army's primary ground-air antiaircraft weapon.

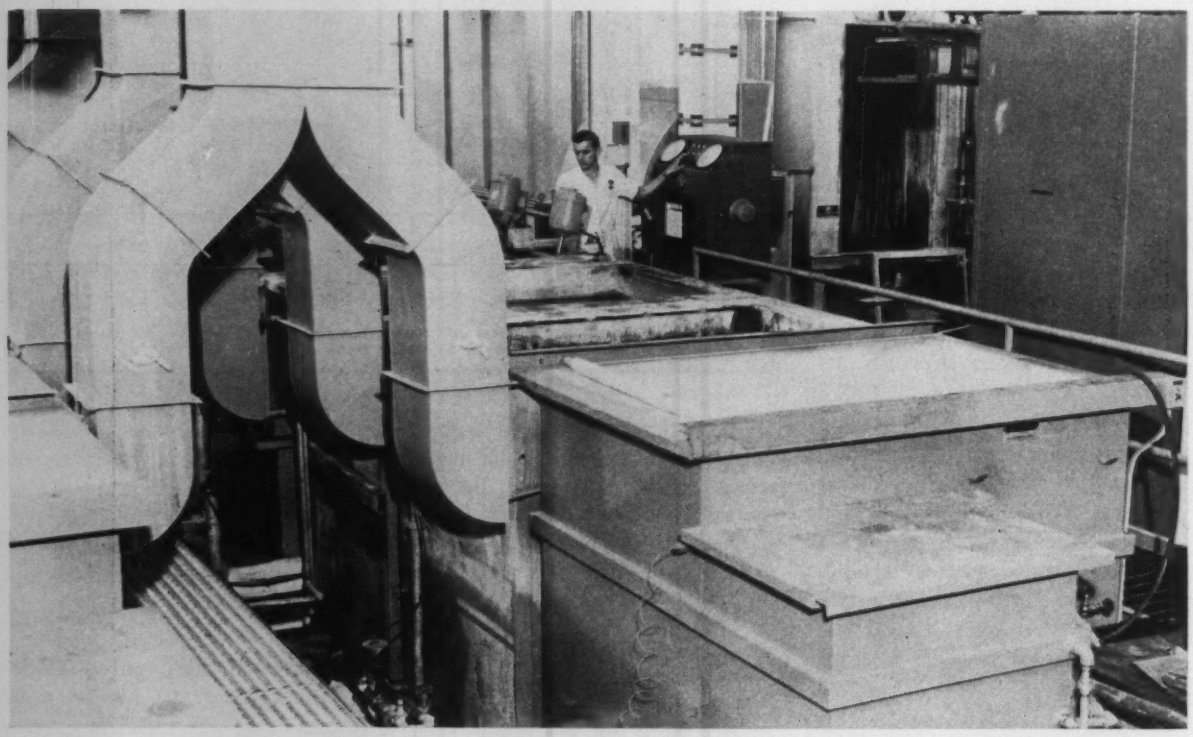
The heart of the hard anodizing installation, consisting of five process and rinse tanks, is a constant current, constant voltage control, automatically - controlled 100-v, 1000-amp rectifier. This unit was designed and built by Hanson-Van Winkle-Munning Co., Matawan, N. J.

Big Job—An example of the work which Douglas successfully processes in this setup is a hydraulic cylinder for the Nike Hercules. Because the missile may be stored for many years before use, and because its components must be periodically tested during storage, the cylinder's interior must meet certain specifications.

It must contain a hard wear surface. This same surface must also resist both corrosion and cracking. Hard coat anodizing was the only process capable of meeting these specifications.

In essence, hard coat anodizing is a process for creating a relatively thick network of interlocked aluminum oxide crystals on the surface of aluminum. The hard coat of aluminum oxide is produced by impressing a high current onto the work to be processed while it's immersed in a low-temperature current-conducting solution. The high current is produced by a relatively low and varying voltage.

Higher Voltage — During the process of hard anodizing, the resistance of the aluminum increases as the thickness of the aluminum



START OF THE LINE: In the first step of the hard coat anodizing line the work is lowered into a chilled anodizing tank. The processing consists of five process and rinse tanks to handle missile parts.

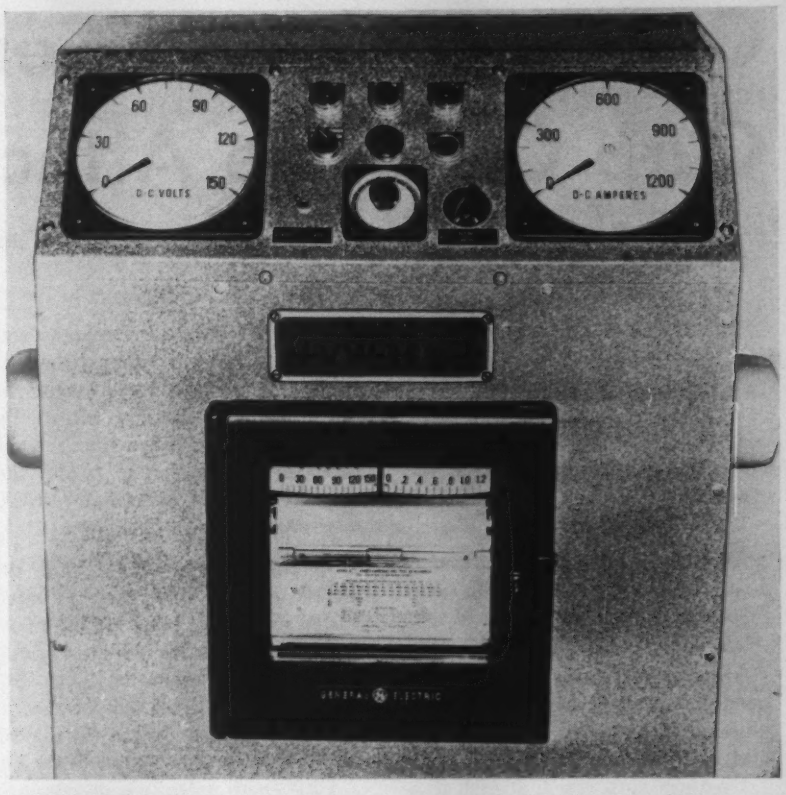
oxide coating increases. To keep the amount of current on the work surface constant, an essential step in the process, it's vital to supply increasing voltage to the work.

The H-VW-M rectifier current control console accomplishes this feat automatically. During processing, the rectifier requires no supervision whatsoever.

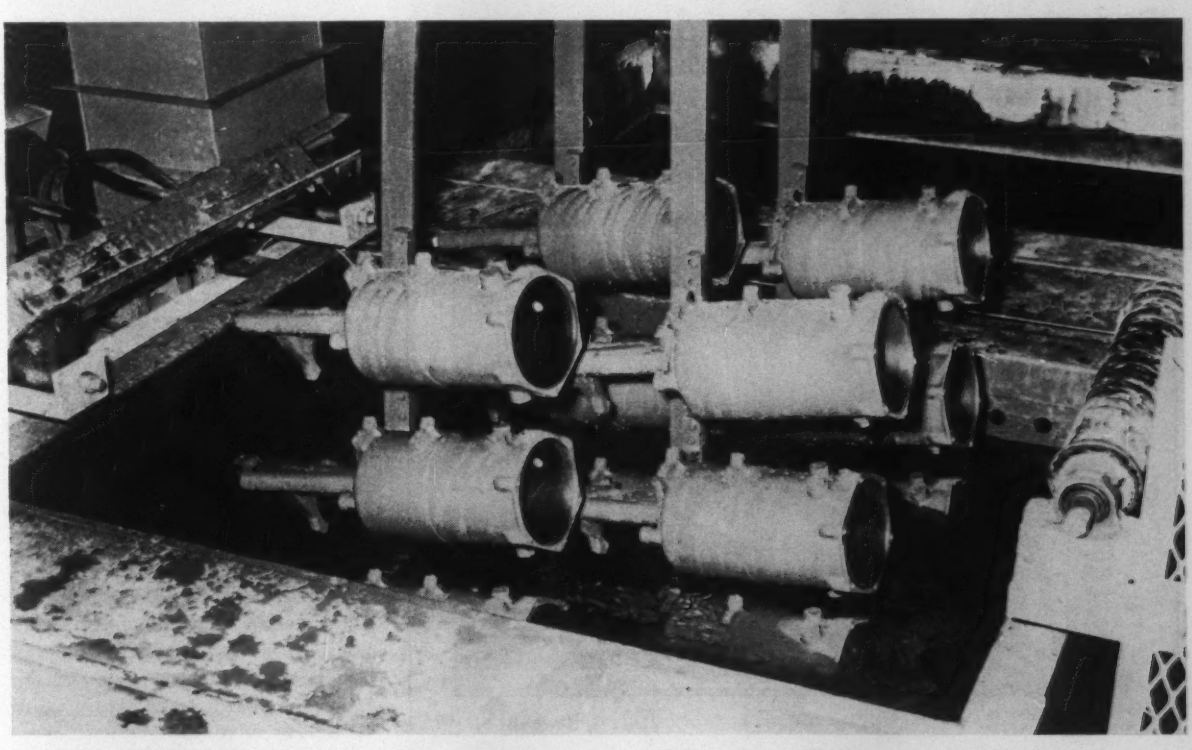
Over an Hour—At Douglas, the anodizing cycle takes about 75 minutes to complete. It's necessary to provide a constant current of 25 amp per sq ft to the hydraulic cylinder to get good results.

At the start of this cycle, the voltage requirements to maintain this current stand at between 10 and 20 v. At the end of the cycle, 85-90 v are needed to maintain the 25-amp current density.

The rectifier control panel includes a recording ammeter and voltmeter. They combine to help Douglas record changes in the process. The result is maximum control and surface uniformity. Several safety features are included that protect the unit from damage.



NEW RECTIFIER: Control console automatically changes current and voltage as work requirements demand. It contains many safety devices.



AFTER ANODIZING: Work withdrawn from the tank after anodizing exhibits a dark exterior. This is a plastic coating which prevents work exterior from being anodized. Solution temperature is 20°F.

Can Enamels and Ceramic Coats Curb Corrosive Attack?

By **G. L. Geltman**—Development Engineer, Solid Rocket Plant, Aerojet-General Corp., Sacramento, Calif.

Kitchenware to jet engines is the span covered by porcelain enamels and ceramic coatings.

How well do these coated metals compare with those uncoated?

▪ Porcelain enamels and ceramic coatings are applied to a wide range of metals for a wide variety of uses —industrial and commercial.

However, new fuels, space-flight needs and higher operating temperatures point up the need for new and better coatings.

Coatings must resist, at high temperatures, various atmospheres and corrosive media. Protection is needed to allow replacement of more costly high-alloy metals by low-alloy metals, to lengthen the use of existing parts and to permit the use of these parts under more severe environments.

Resist Scaling — How well do metals resist high temperatures? Listed in the first table are the maximum temperatures which various alloys can withstand without excessive scaling. This temperature is usually that point where 10 mg/sq cm of scale occurs within 1000 hr.

How much protection do coatings give? The first chart points up the relative oxidation rate of uncoated and coated cold-rolled steel above 1000°F. Included for comparison are oxidation rates of other coated and uncoated alloys.

Note that the coated metal steel shows much less corrosion. This is borne up by operating data. For example, coated cold-rolled steel has been used at 1600°F, 1700°F, and even up to 1850°F for short times.

Extends Life—Coatings on superalloys also show longer performance life. They've even been developed for such corrosion-resistant alloys as Inconel and Hastelloy for use over 1850°F.

Embrittlement is related to the degree of intergranular oxidation. Therefore, coatings which reduce oxidation also delay embrittlement. The second chart shows how coatings on cold-rolled steel and an alloy steel affect embrittlement.

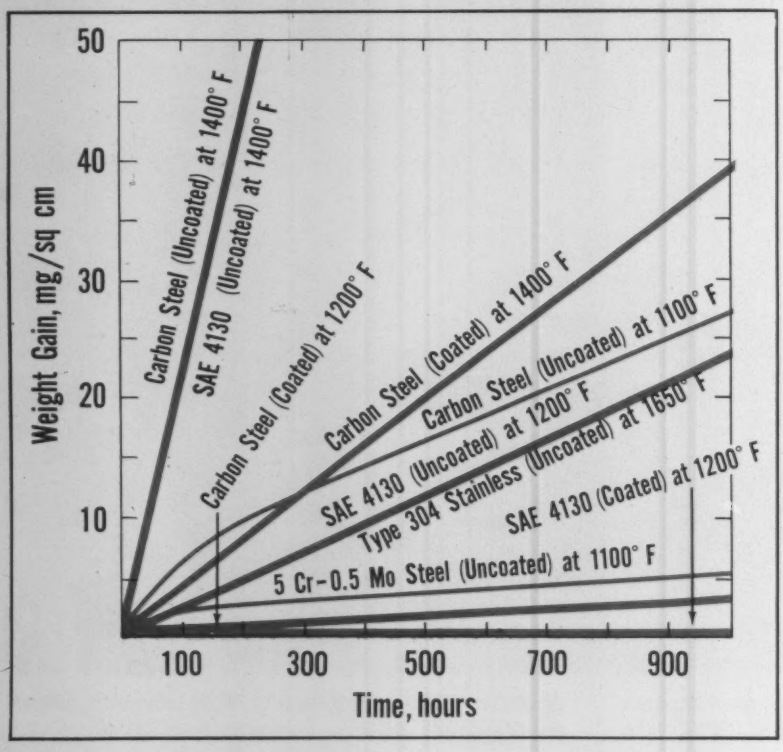
Similarly, tensile strengths can be maintained for longer lengths of time. Why? Because scaling, if not limited, reduces the effective cross-section.

A Difference Exists—What's the distinction between porcelain enamel and ceramic coating? The former is defined as "glass fused to metal." The latter is defined as a "converted porcelain enamel whereby refractory particles are embedded within a glass matrix."

Highly-resistant "glassed steel" is widely used in the chemical, pharmaceutical and brewing industries. Containers, reactors, or vessels, made of this material, are used for a number of reasons.

They include resistance to most acids and adherence of chemical-

Coatings Resist Scaling



process products; absence of catalytic effect; ease of cleaning; replacement of high-alloy metal by glassed steel.

Despite initial high cost, economies result in the long run. The reasons: longer production runs, and fewer takedown and cleaning operations.

Compares Coatings—Much data are available on the acid resistance of porcelain-enameled or glassed steel. But how about a direct comparison between different types?

The third table compares the rate of attack of various acids on a high alloy metal, a porcelain enamel for kitchenware use, and a special acid-resistant coating to resist chemical corrosion.

The data should not be the sole determining factors when selecting a coated metal. The application must also be considered.

Attack Is Expected—Consider a coating for kitchenware where limited attack by corrosive agents is expected. The white acid-resistant coating is acceptable despite deterioration.

Here's another example. A particular high-temperature porcelain-enamel coating was developed for use as a heat-corrosion-resistant coating above 1750°F. Yet, it deteriorates at the rate of 0.35 in. per year in boiling 5 pct sulphuric acid, and 0.70 in. per year in boiling 10 pct sodium hydroxide.

Obviously, this coating cannot be used for acid resistance on a continuous basis. It will, however, resist the corrosive by-products of internal-combustion engines at fairly high temperatures.

Fuels Bring Problems—With the development of new fuels, especially the high boron groups, a number of serious corrosion problems arises.

Coatings to resist boron and boron oxide atmospheres have been the subject of study and development for a number of years. Early effort was on the use of chrome-oxide coatings. These are successful only up to 1700°-1800°F under static conditions, because chrome oxide, very useful in high temperature for-

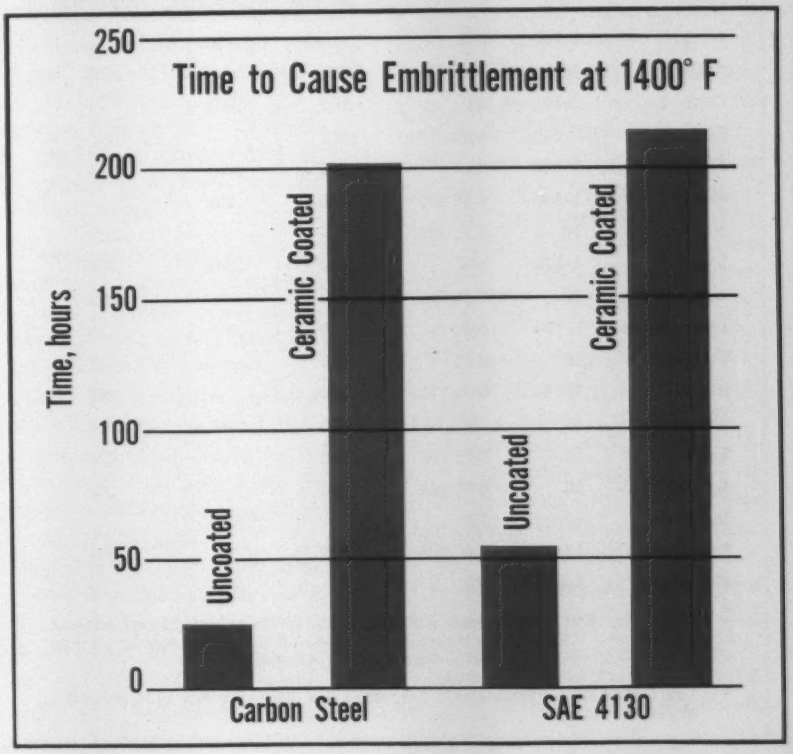
What Is Temperature Limit?

MAXIMUM SERVICE TEMPERATURE WITHOUT EXCESSIVE SCALING*

Alloy Nominal Analysis	AISI Type No.	Maximum Temperature, °F
4-6 Cr-Mo	502	1150
8-10 Cr	—	1200
12-14 Cr	420	1200
10-14 Cr	410	1250
14-18 Cr	440	1400
14-18 Cr	430	1550
18-8	303	1600
18-8	302	1650
18-8	304	1650
18-8 Mo	316	1650
18-8 Ti	321	1650
18-8 Cb	347	1650
23-30 Cr	446	2000
25-12	309	2000
25-20	310	2000

* 10 mg/cm²/1000 hours is considered excessive scaling in air atmosphere.

How Embrittlement Is Affected



mulations, forms glass above 1800° F with boron and boron oxide.

More recent work was on coatings having large amounts of boron nitride, silicon-boron and other oxide and cermet combinations. Thus a great need for improvement exists, especially to increase operating temperatures.

Need Improvement — Jet-engine fuels containing lead bromide cause serious corrosion problems in various vital components. High cobalt-bearing alloys to aluminum diffusion coatings and some ceramic coatings have been tried. A number of coatings reduce deterioration of type 321 stainless steel by 50 pct.

How Mild Steel Scales in Air

Temperature, °F	Weight Gain, mg/sq cm/1000 hr	
	Uncoated SAE 1020	Coated SAE 1020
1000	—	.2
1100	27	—
1200	50	3.6
1400	220	39.0

National Bureau of Standards

Coatings Prevent Attack

Corrosive Acid	Concentration, pct	Temperature, °F	High-Alloy Metal* (Uncoated), in. per year	High Acid-Resistant Glass Fused to Carbon Steel in. per year	White Acid-Resistant Enamel** Applied to Carbon Steel in. per year
Acetic	5–100	300	—	.005	—
Acetic	10	B.P. 213	.005	—	.005
Citric	1–10	70	.002	.005	—
Citric	1–20	B.P.	.002	—	.02
Formic	1–100	70	.005	.005	—
Nitric	1–100	B.P. 225	.650	.005	—
Nitric	10	B.P. 225	—	—	.020
Lactic	1–100	110	.005	.005	.020
Hydrochloric	10	B.P. 219	.050	.005	.020
Hydrochloric	1–100	300	.500	.005	—
Pyrogallic	10	B.P.	.020	—	.001
Maleic	10	B.P.	.020	—	.020
Tartartic	10	70	.020	.005	.020
Sulphuric***	10	B.P. 216	.050	—	.025
Sulphuric	60	B.P. 284	.010	—	.002
Sulphuric	60	450	—	.005	—
Phosphoric	10	B.P. 212	.001	.005	.005
Phosphoric	1–100	300	.2	.005	—

* High alloy metal composition approximately: 15 chromium, 15 molybdenum, 3.5 tungsten, 4.5 iron, 57.0 nickel, 0.08 carbon, 1.0 silicon, 2.5 cobalt, 1.0 manganese, 0.35 vanadium, 0.04 phosphorus, 0.03 sulphur.
** Cover coat kitchenware enamel.
*** Low carbon steel deteriorates at the rate of 21.9 inches per year in 10 pct H_2SO_4 at 216°F.

Experience shows that reducing and sulphurous atmospheres may be as dangerous as oxidation. Diffusion of carbon tends to embrittle metal. This results in cracking, fatigue failure, and poorer load-bearing capabilities.

Cast-iron air-hose couplings used in rail cars severely corrode due to water vapor around the gasket. A porcelain-enamel coating, fired at 1350°F extended their life.

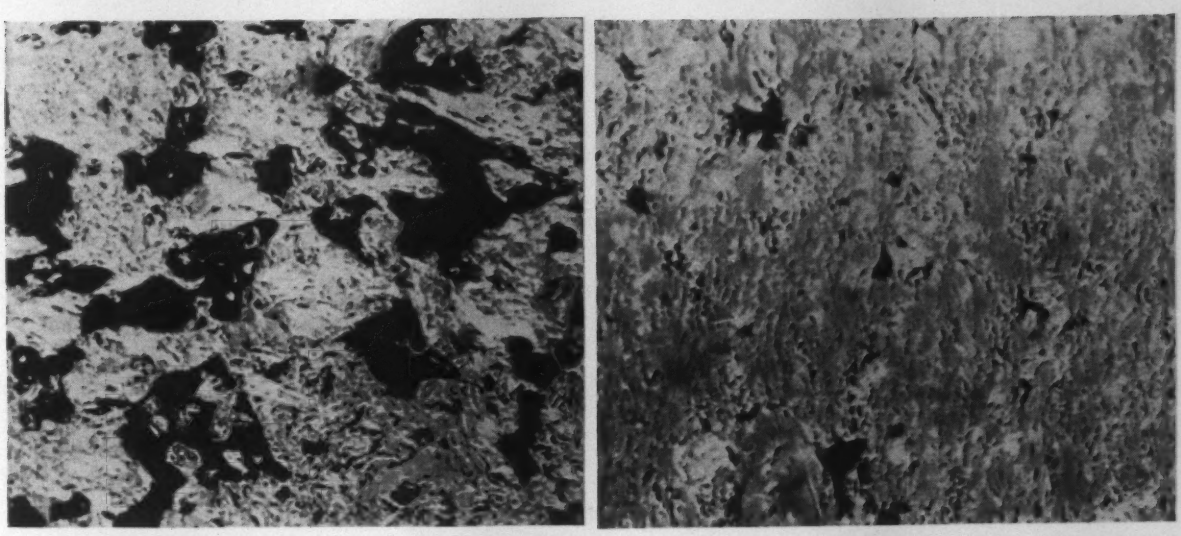
Resists Gases—One of the leading jet engine manufacturers tests high-temperature ceramic coatings at 2375°F in a 6-in. diam simulated ramjet engine duct. This coating cuts down corrosion from a high-velocity gas stream directed against Inconel panels. Resistance to thermal cycling is also improved.

This same coating, when applied 0.001 in. thick to 0.065-in. stainless steel, has been bent at room temperature 150° around a ¾-in. mandrel. It has also been water quenched several times from 2375°F into cold water without failure despite severe distortion.

Increase Tool Life — Ceramic coatings and high-temperature porcelain enamels increase tool life up to 43 pct—dependent upon furnace location. Also, the need for periodic reworking and sandblasting is eliminated. The long-run cost of high temperature corrosion-resistant coatings is about half that of higher alloy use and its periodic sandblasting costs.

Black cast-iron pipes are widely used as thermocouple protection tubes. They're also used for injecting chlorine into molten aluminum for fluxing and degassing.

The temperature range is from 1250°-1350°F with possible surface temperatures of 2000°F. The average life of the pipe is usually less than 20 minutes. Stainless steels cannot be used because aluminum and chromium are completely miscible. Porcelain enamels and ceramic coatings have been used effectively to increase the life of the tubes or pipes to over 100 minutes. In some cases, pipes have been used more than 300 minutes.



CLOSE PACKING: New super-graphite features high density. Standard graphite (left) has bulk density of 1.73 g/cc. On right is new recrystallized graphite. Densities as high as 2.16 g/cc have been attained.

New Graphite Takes More Heat

There's one property that's vital to the performance of graphite for high temperature use.

The density of a new super-graphite is near the theoretical value.

■ A new series of high-density super-Graphites is claimed to have great promise as high-temperature rocket materials.

By a new hot-working process, National Carbon Co., Div. of Union Carbide Corp. produces a recrystallized graphite. This unique structural material has about two to three times the high-temperature strength of standard graphites. Moreover, it has usable strength up to 5500°F.

Structure Is Factor—Credit for the high strength and very low creep rate of this graphite is given to the crystal makeup and grain structure. The high machinability and thermal shock resistance are also due to its polycrystalline nature.

"Graphite's uniquely versatile combination of properties has long kept it in the forefront among high-temperature materials," explained W. A. Steiner, vice president, technology, for National Carbon.

"This new break-through is a significant forward step in our advanced materials technology, and provides a fresh new approach to the solution of astronautical materials problems we have been working on for years."

Compares Favorably—In rocket motor tests, nozzle inserts made of the new graphite compared very favorably with other well-known high temperature materials.

There are no technological limitations to the size in which the new graphite can be produced. Cylinders as large as 8-in. diam and 10-in. long have been made. Larger pieces are anticipated.

The recrystallizing process achieves a more uniform and compact graphite structure. By close control of the process, grain orientation can be varied to produce a range of super-graphites. Each grade has its own set of properties for a special high-temperature job.

Keep Process a Secret—How is this new graphite produced? Results thus far, claims National Carbon, have been so outstanding that the exact process details have been classified by the USAF. All production has been earmarked for the military for the immediate future.

The new super-graphites fill a gap in the materials field. Artificial graphites have densities up to about 1.85 g/cc. Natural graphite and pyrolytic graphite have densities nearing the theoretical value of 2.26 g/cc.

This level is now also attained by National Carbon's recrystallized graphite. Super-graphites have been produced with densities of 2.16 g/cc. This means a great reduction in porosity. Thus, the gas permeability of the new graphite is considerably reduced.

Room-temperature flexural strength of recrystallized graphite is about 6000 psi. The strength increases at higher temperatures, until at 4500°F, it's about double the room temperature value.

Tungsten-Arc Welding Torch Cuts Light-Gage Metals

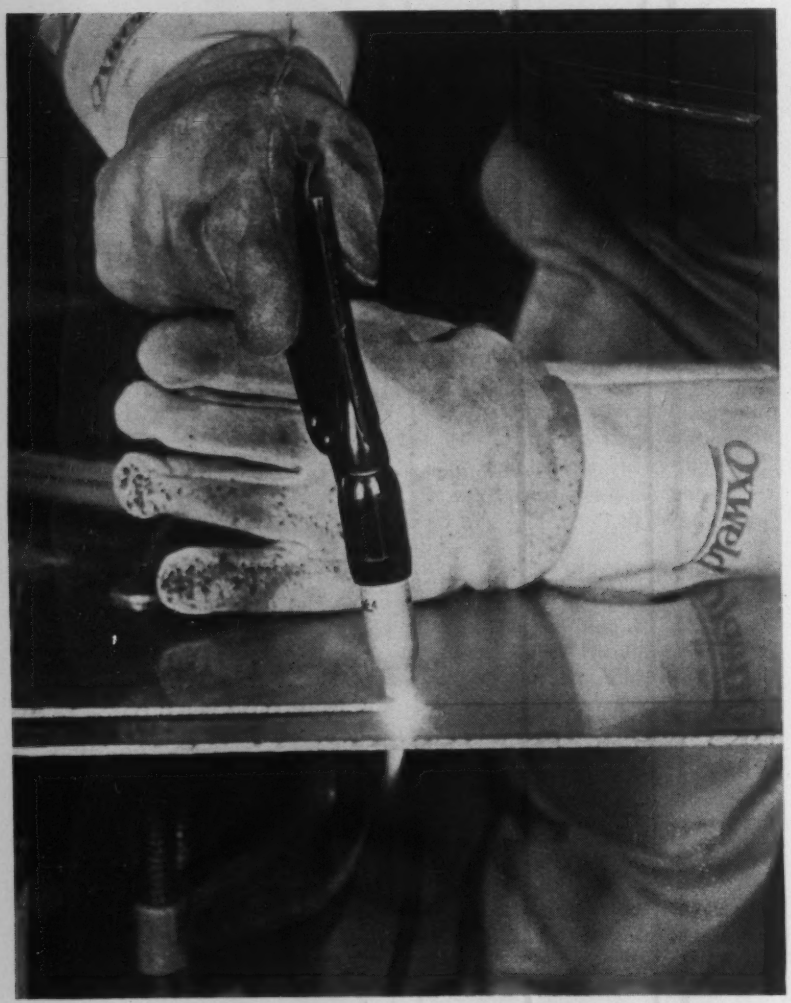
Heliarc welding torches, once used only to weld, now can handle cutting jobs.

A new concept proves some torches can cut aluminum, magnesium, copper and stainless steel up to ½ in. thick by merely boosting the current density.

■ Complete fabrication, from cutting of metal to final welding into a finished product, can now be done with a single Heliarc torch. Recent studies on the tungsten-arc concept show that welding and cutting can be done with the same gun by only increasing the current density.

It's an extra bonus that was not considered when the welding unit was purchased. This adds up to an unexpected dividend at no additional capital investment.

The Linde Co., Div. of Union Carbide introduced the tungsten-arc process in 1943. Since then the company has continued to develop the concept by searching for new uses.



DOES TWO JOBS: Standard Heliarc welding torches, with a rated capacity of over 300 amp, may now be used for both TIG welding and cutting.

First Process—Much effort was aimed at finding a cutting process to replace time-consuming mechanical and metal-arc cutting methods. The study resulted in the Constricted-Arc cutting process introduced in 1955.

How does it work? The intense arc, protected by an inert-gas shield, is tranferred from a tungsten electrode to the workpiece. Before reaching the workpiece, however, the arc is constricted in a narrow orifice at the end of the cutting torch. This constriction creates a high-velocity arc that easily melts and forces a narrow kerf through both ferrous and nonferrous metals.

In contrast, Heliarc cutting uses the tungsten electrode and the inert-gas shield, but does not constrict the arc. Hence, the same torch can be used to either weld or cut most common metals. To mention just a few, they are: aluminum, magnesium, copper, aluminum-bronze, and stainless steel.

How It's Done—Cutting is accomplished by raising current density above good welding conditions. Keep in mind that argon-hydrogen shielding mixtures are also used to maintain a clean-cut surface.

Normal gas flow rates (40-60 cfh) are sufficient to transfer energy across the arc and displace the molten metal. Good kerf quality is

obtained on one side of the cut, while the other side is trimmed away as scrap.

To start the cutting process, the tungsten electrode is simply scratched against the base metal. The arc length in this case is not a critical factor. Any standard dc power source with a 70-v open circuit may be used for Heliarc cutting.

The metal thicknesses that can be handled by the process range from ⅛ to ½ in. Some typical cutting speeds are 40-60 ipm on ⅛-in. aluminum and 20-40 ipm on ⅛-in. stainless steel.

Torch capacity must be at least 300 amp. Using a torch with a capacity lower than 300 amp will only result in torch damage.

It's Your Choice—For critical fabrication, mainly on high-production schedules, Constricted-Arc cutting continues to provide the highest cutting speed and quality. Constricted-Arc cutting will slice any thickness of metal between ¼ to 4-in. thick.

With Constricted-Arc cutting, both sides of the cut are normally dross-free and have excellent kerf quality. Cutting speeds can run as high as 1000 ipm.

Straight lines, bevels, circles and shapes are cut with equal ease on either single thickness or on stacks of sheets.

So Why Heliarc?—Now look at the points Heliarc cutting offers. The torch you now have in operation can perform double duty. That is, of course, if its rated capacity is above 300 amp.

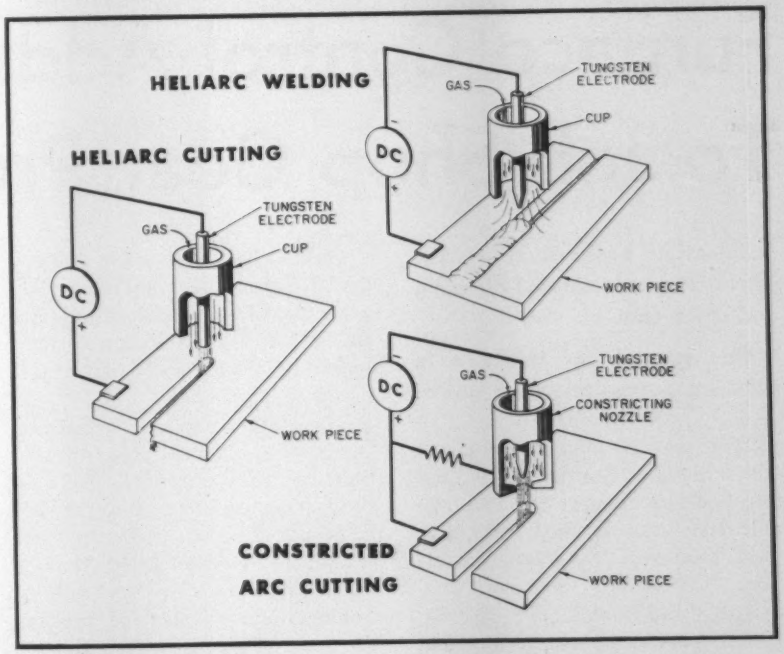
The torch can be operated manually or it can be set in a mechanized fixture. If you can get by with a cutting speed of 40-60 ipm and you're only interested in obtaining one clean cut side, the bonus of one gun with a dual purpose is worth considering.

By simply setting the amperes back to the normal welding range, the tungsten-arc torch is ready to perform its regular welding chore. The Heliarc torch can also be used in any welding position such as: flat, horizontal or vertical.

Both the welding and cutting processes use an inert gas to protect the weld pool or cut edges from adverse effects of oxygen and nitrogen in the air. This is done by a soft stream of argon or helium which flows from an inverted cup or shield around the electrode to form a gaseous protective cover over the critical areas.

MUCH FASTER: The Constricted-Arc cutting process continues to provide fast, high-quality TIG cutting on metals up to 4 in. thick.

Compare Basic TIG Processes



BETTER RESULTS: Provide ample space between small parts on furnace fixture for accurate carburizing.

Furnace Control Adds Precision To Job-Shop Gear Production

Selective carburizing of the job lot requires careful planning and close control.

One example of this rule in action concerns precision gears.

■ Precision is always associated with automated heat-treat lines. But job-shop heat treaters can also provide consistent, quality parts. For many of them, it's a routine operation.

The Brad-Foote Gear Works, Chicago, is an example. In a typical run, a batch of 36-in. gears were carburized at 1750°F for 32 hours and then tempered for several hours. Carburizing depth was 0.132 in. Yet, the batch of gears was held to total runouts of 0.004 in. Other production is held to relative accuracy.

Plant is Not New—How do they do it? This is no brand-new plant with brand-new equipment. But Brad-Foote is an orderly, well-picked-up plant of middle-age industrial buildings.

There are no special techniques. Company spokesmen point out that they use only standard, everyday production methods. But the key is to use them carefully and systematically. It pays to be "handy, rather than smart."

Plant output is divided between the company's own brand-name units, and gears for other machinery manufacturers.

Gears are prepared for heat-treatment by degreasing. The degreasing unit is normally operated at 180°F. Five-minute cycles are usually long enough to remove all traces of crayon, fingerprints and other foreign matter. For uniform carburizing and quenching, gears must be absolutely clean at this stage.

Takes Plating — Suppose gears are to be masked. They are first degreased, then copper plated and degreased again before going into a Leeds & Northrup Homocarb unit. At this point, the gears are at about 160°F.

Furnaces are loaded carefully, but heavily. A typical load for a 35 x 48 in. unit is fifty-four 42-lb pinions, or 2268 lb. In addition to this furnace, there are two units, 25x36 in. and one measuring 24x84 in.

Each furnace features a Microcarb control to measure carbon potential of the furnace atmosphere. Thus control allows the heat treater

FINAL CHECK: The material control laboratory checks the gears many times during the heat treating cycle.

to come within 10 points of any desired depth of carburization.

Samples Give Depth—Every furnace load includes pull samples for determining case depth. The last sample is photomicrographed after heat treatment. Prints of the photos, and of the Microcarb charts, Homocarb temperature charts and Homo tempering-furnace charts are supplied to the Brad-Foote customer. The company keeps the original records for 7 years.

Quenching follows carburization. It's important that the quench bath be given ample agitation. Oil temperature is regulated through a 40-ton package liquid cooler which can remove 3600 Btu per minute.

There are three 1200-gpm circulation pumps to control the agitation. The cooling water system is closed for better control as well as economy. Tempering is done in three Homo furnaces, ranging in size from 28 x 28 in. to 39 x 48 in. A typical cycle is 3 hours.

Despite the fact that furnaces are never permitted to shut down —except for maintenance—they are claimed to be as good as new. All it takes is preventive maintenance

SET SCOPE: Gear distortion is held to a minimum by following preset procedures throughout the process. Care here holds runout to 0.004 in.

Portable Riveter Operates Fast

Unit Punches Holes and Sets Rivets in Two Seconds

High-speed machines feed and set flush- and round-head rivets to speed assembly work.

Flexibility is the byword. The newcomers serve as fixed- and portable-assembly units.

■ Described as the world's first portable riveter, a new unit is reported to operate eleven times as fast as existing methods.

The lightweight newcomer, made by the Electronics Div. of ACF Industries, Riverdale, Md., performs all riveting operations automatically. Total cycle time is less than two seconds. This time period includes hole punching, rivet placement and final heading.

Easy to Handle—Weight of the riveter is about 25 lb. Thus, it's portable for a wide variety of jobs in the average metalworking shop. Current use centers on aluminum windows and ladders, electronic cabinets, metal containers, air-conditioning equipment, house trailers, farm equipment and metal awnings.

A cable-type balancer allows the new unit to serve for overhead-suspension work. Well-planned design also enables the riveter to be permanently installed on a work bench.

Basically the portable unit resembles ACF's other stationary models. The main exceptions are the small size and light mass. Also, in the new unit a finger trigger and a hand grip control the high-speed punching and riveting actions. In the standard models, on the other hand, foot-pedal controls are employed.

FIXED ALIGNMENT: Rivets feed into aligned holes. As each rivet enters the punched holes, it displaces an alignment pin from the workpiece.

Fast Assembly—Here's a quick rundown on the portable's operation. After the operator inserts the workpiece or assembly members in the riveter's jaws, he squeezes the unit's trigger. This activates a punch which puts holes through the assembly members.

A locating pin, held by light spring pressure, keeps the punched holes in alignment. When the rivet enters these holes, it displaces the alignment pin.

During the piston's punch stroke, the rivet shoe feeds the rivet into the holes. Each rivet drops from a pneumatically-driven rotating drum. This drum holds 500 rivets.

By turning the hand grip slightly to the right, the operator actuates a detent. This action arms the device. Again, the trigger is pulled. This time, the riveter places and heads the rivet. Rivets may be either the flush- or round-head variety.

The portable unit serves for many applications which can't be handled on stationary riveters. Tests show the newcomer meets the most exacting specifications with respect to strength, uniformity and appearance.

HERE'S THE WAY

TO ROUND OUT YOUR INVENTORIES:

USE OUR . . . .

When gaps suddenly appear in your steel stocks, replenish them in record time by requesting Red Circle Service from Acme-Newport. These orders are coded with a red circle that guarantees immediate handling through every step of sound steelmaking and processing. Your specifications are followed in minute detail, with the same skill that has marked our growth over 76 years. Whatever your requirements for delivery and quality, you'll like what you get from Acme-Newport.

Acme-Newport Steel COMPANY

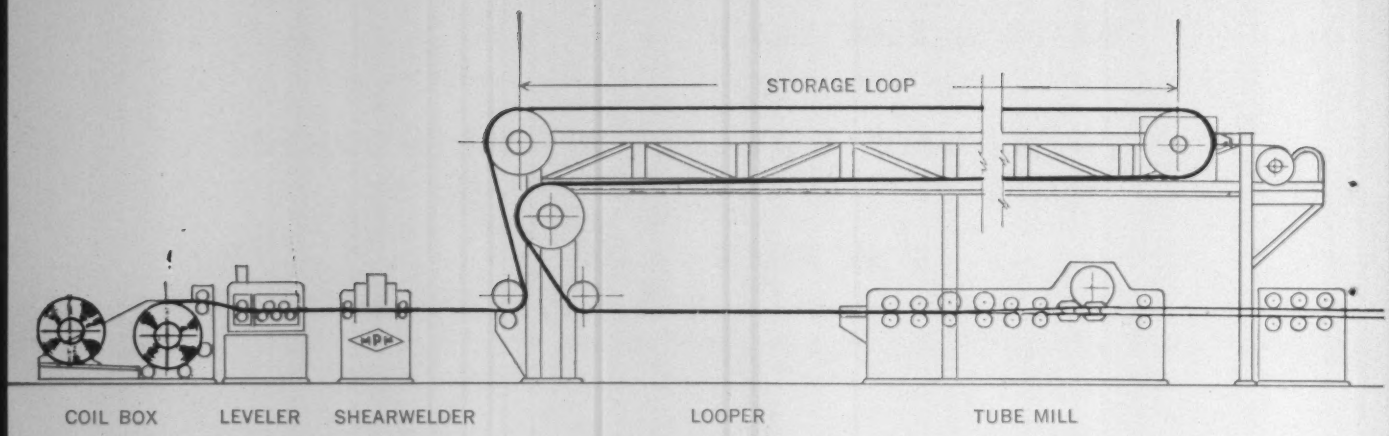
NEWPORT, KENTUCKY

A SUBSIDIARY OF ACME STEEL COMPANY

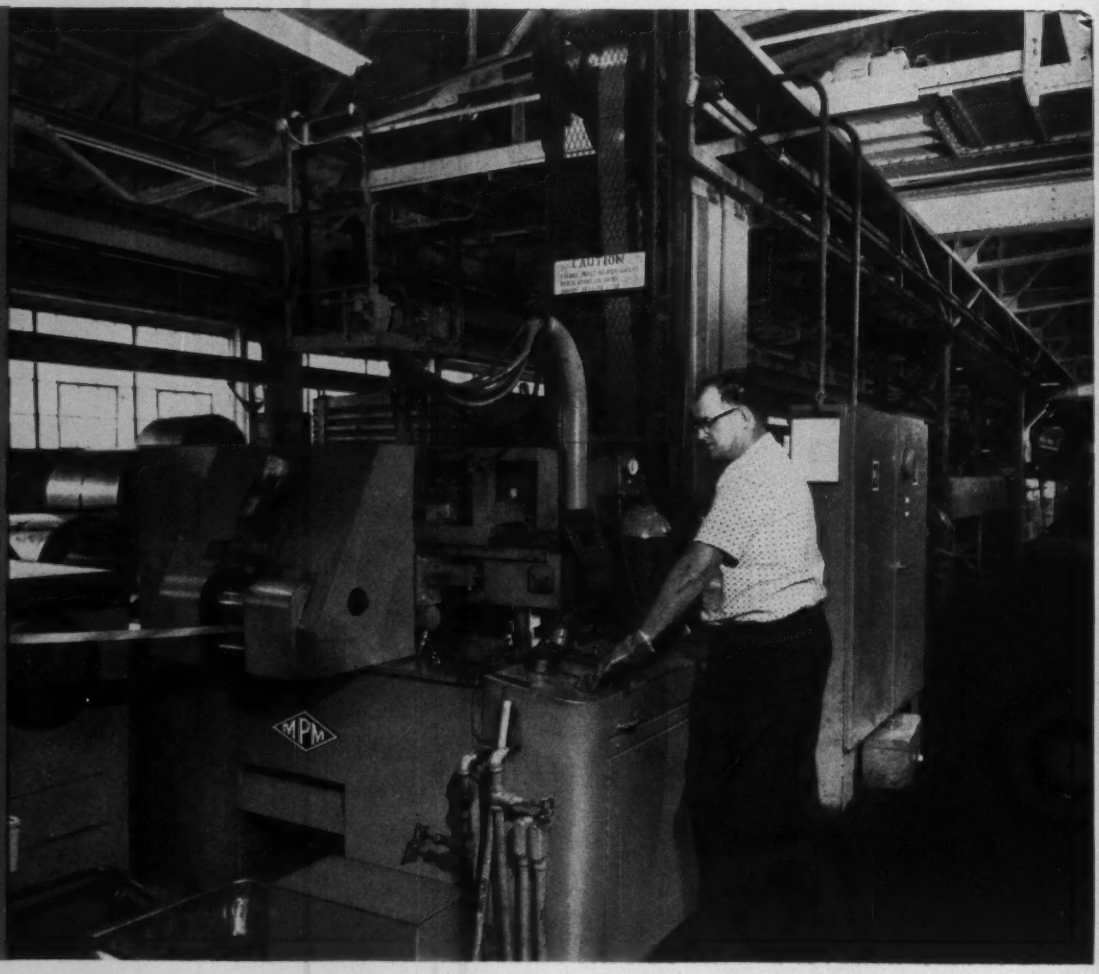
PRODUCTS OF ACME-NEWPORT STEEL

Hot Rolled Steel in Coil	Cold Rolled Steel in Coil (*full hard only*)	Plates (3/16" *and lighter*)
Hot Rolled Pickled Steel in Coil	Cold Rolled Sheets	Electrical Sheets
Hot Rolled Sheets	Alloy Sheets and Plates	Electric Weld Line Pipe
Hot Rolled Pickled Sheets		Spiral Welded Pipe

Steel



Here's the surest and most efficient



One of several MPM Shearwelders at work in the automotive industry. This unit keeps the McKay Tube Mill running continuously, doubling its production and reducing costs by more than $50,000 per year.

THE MPM SHEARWELDER WITH STRIP LOOPER CAN DOUBLE YOUR OUTPUT WITH NO ADDITIONAL LABOR!

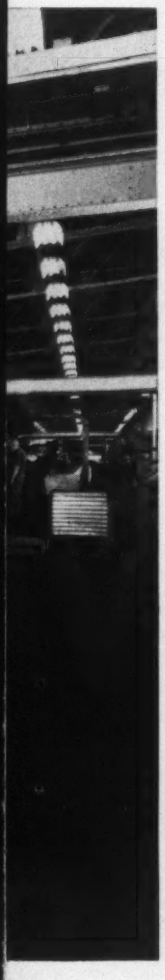
Custom designed to meet space requirements, the MPM Strip Looper is a precision controlled, automatic strip storage device, permitting continuous line operation while coil ends are joined together.

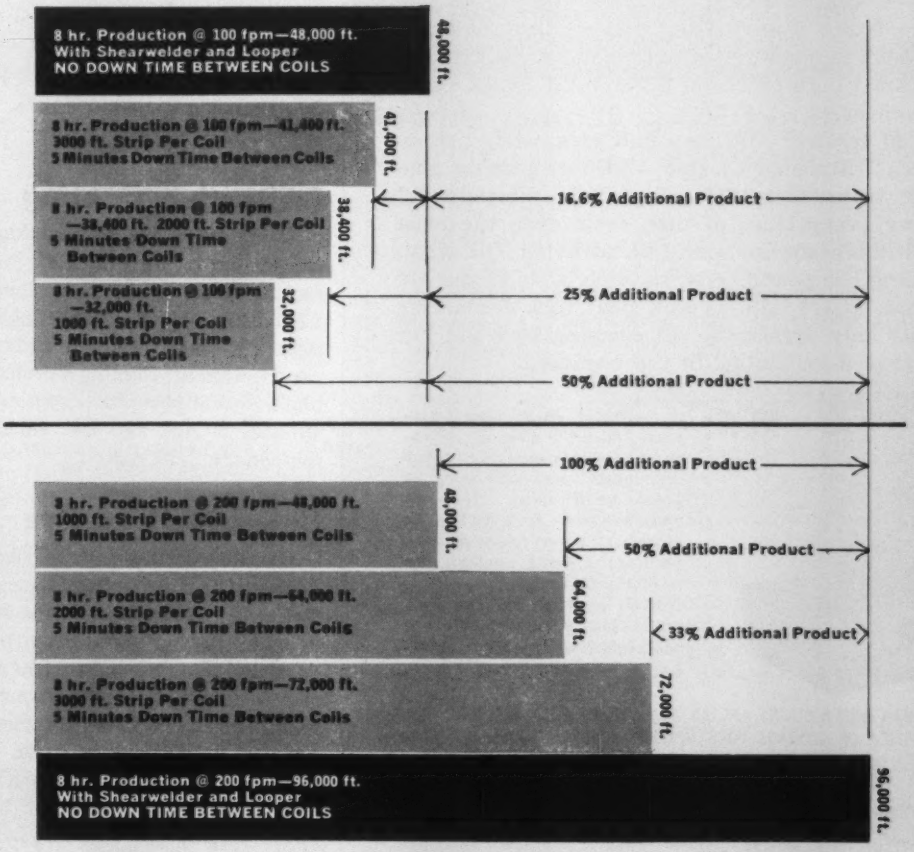
The MPM Shearwelder is the fastest, most accurate and compact machine of its type. It produces positive, ductile, smooth joint welds in ferrous or nonferrous strip which permit subsequent rolling, forming or blanking operations without flash trimming or grinding.

The MPM Shearwelder and Looper will convert your present tube mill into a continuously operating production line. Built-in automation features eliminate the need for skilled labor.

Check the chart below to estimate possible increased production. You are operating in "the red" if you don't use the MPM Shearwelder and Looper.

way to increase tube mill production




8 hr. Production @ 100 fpm—48,000 ft.
With Shearwelder and Looper
NO DOWN TIME BETWEEN COILS
48,000 ft.
8 hr. Production @ 100 fpm—41,400 ft.
3000 ft. Strip Per Coil
5 Minutes Down Time Between Coils
41,400 ft.
16.6% Additional Product
8 hr. Production @ 100 fpm
—38,400 ft. 2000 ft. Strip Per Coil
5 Minutes Down Time
Between Coils
38,400 ft.
8 hr. Production @ 100 fpm
—32,000 ft.
1000 ft. Strip Per Coil
5 Minutes Down Time
Between Coils
32,000 ft.
25% Additional Product
50% Additional Product
100% Additional Product
8 hr. Production @ 200 fpm—48,000 ft.
1000 ft. Strip Per Coil
5 Minutes Down Time Between Coils
48,000 ft.
50% Additional Product
8 hr. Production @ 200 fpm—64,000 ft.
2000 ft. Strip Per Coil
5 Minutes Down Time Between Coils
64,000 ft.
33⅓% Additional Product
8 hr. Production @ 200 fpm—72,000 ft.
3000 ft. Strip Per Coil
5 Minutes Down Time Between Coils
72,000 ft.
8 hr. Production @ 200 fpm—96,000 ft.
With Shearwelder and Looper
NO DOWN TIME BETWEEN COILS
96,000 ft.

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METAL PROCESSING MACHINE COMPANY • YOUNGSTOWN, O.

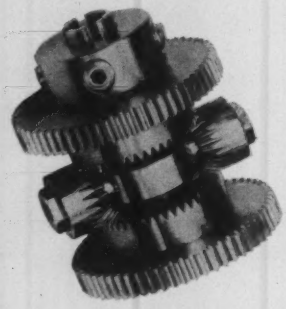
DIVISION OF McKAY MACHINE CO.

MPM

McK

CLEAN AS PHOEBE SNOW?

NO... CLEAN AS A DIFFERENTIAL!



Phoebe Snow (of Buffalo) was the spotless-white symbol of cleanliness in the 90's, when the Lackawanna Railroad was selling train travel. Today, she wouldn't quite fill the bill; this ultrasonically cleaned high-precision differential comes closer to space-age standards.

In just 15 to 30 seconds, with the unit completely assembled, an Acoustica Ultrasonic Cleaner—50-watt pulsing generator, ultrasonic transducer, 1½-gallon tank—literally but safely blasts away every trace of dirt, from even the most minute cracks, hidden surfaces and blind holes. Oil, dust, metal chips, lapping compound, even soils invisible to the eye are removed from gears, shafts and bearings. Acoustica equipment has not only drastically cut cleaning time but has substantially improved reliability in the bargain.

NEW: *Acoustica's fully transistorized "20-KC" line of ultrasonic cleaning systems brings new speed and efficiency to your production cleaning operations. Available in standard sizes from 3 to 6 gallons; special systems up to 500-gallon capacity. (Illustrated: 3-gallon SC-252 System.) Acoustica also offers a complete line of standard 40-KC cleaning systems.*

FOR COMPLETE EQUIPMENT DESCRIPTIONS AND AN ANALYSIS OF YOUR CLEANING PROBLEMS, WRITE TO ACOUSTICA OR CONTACT YOUR NEAREST ACOUSTICA REPRESENTATIVE.

acoustica

ACOUSTICA ASSOCIATES, INC.

10400 Aviation Blvd., Los Angeles 45, Calif. • 600 Old Country Road, Garden City, N.Y.

PATENT REVIEW

New Patents In Metalworking

Alloy Inoculant

Inoculants for cast iron, R. W. Freeman (assigned to Union Carbide Corp., New York), Oct. 11, 1960. An alloy for inoculating cast iron comprises (1) 15-20 pct Sn, 48-62 pct Si, 4-6.5 pct each of Mn and Zr, and the balance Fe, or, alternatively, (2) 10-40 pct Sb, 36-58 pct Si, 3-6 pct each of Mn and Zr, and the balance Fe. No. 2,955,933.

Enameled Cast Iron

Dry-process porcelain enameling of cast iron and like articles, T. Tafel, Jr., Sept. 13, 1960. In the enameling of cast iron by the dry process, the enamel is heated to a temperature slightly below the fritting temperature. It is then applied by the conventional methods. No. 2,952,558.

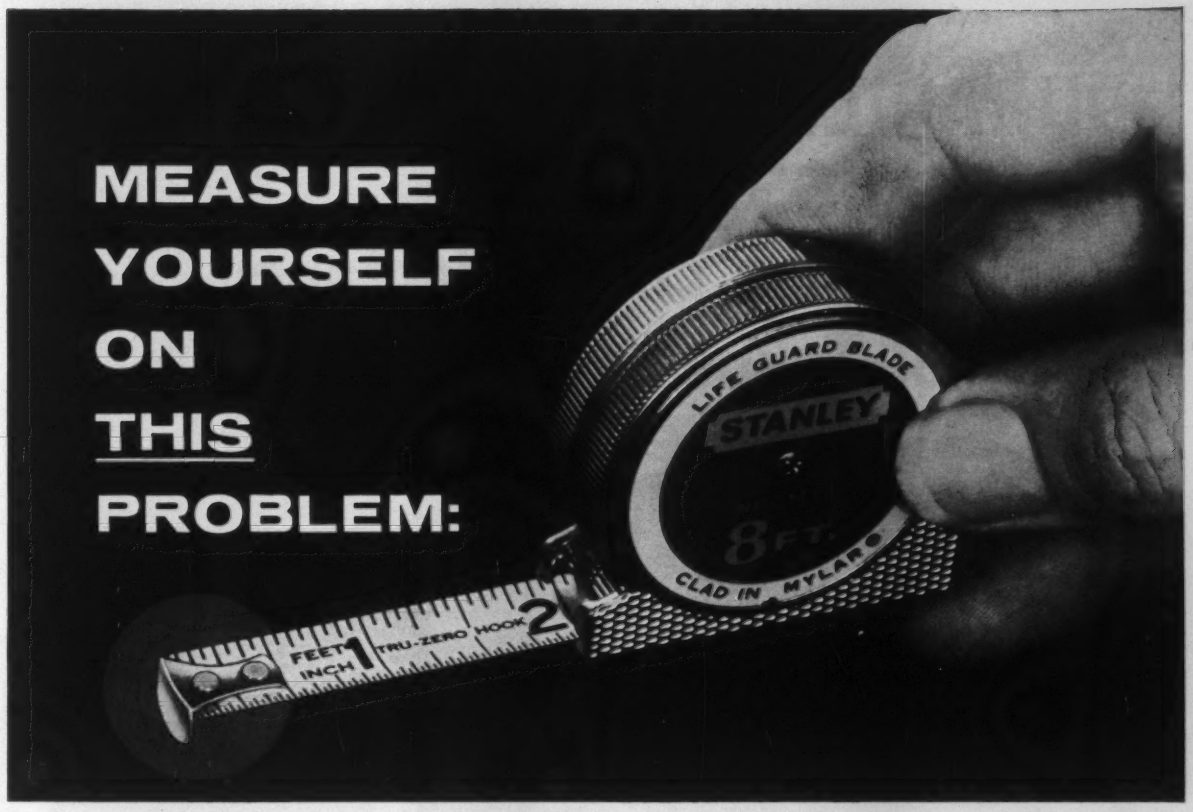
Protective Coating

Composition for and method of coating ferrous metals, C. M. Swalm and S. Spring (assigned to Pennsalt Chemicals Corp., Philadelphia), Sept. 27, 1960. Method and solid composition for forming a protective alkali metal phosphate coating on surfaces of iron and zinc or alloys thereof. No. 2,954,309.

Upgrades Iron Ore

Ore beneficiation, H. V. Atwell (assigned to Texaco Inc., a corp. of Del.), Sept. 27, 1960. In the beneficiation of low-grade iron oxide ores, the ore is ground to 100 mesh and treated with carbon monoxide in a fluidized bed at temperatures of 650-1000°F. The iron oxide particles are selectively disintegrated. The relatively fine values are taken in the off-gas. No. 2,954,288.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.



"Make it slide exactly 0.025 inch . . . hold it securely . . . do it at lowest cost"

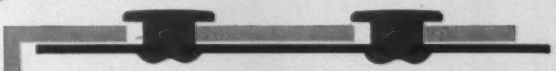
Stanley got the answer from a TRS man

The hook on the end of a steel tape rule must slide back and forth, exactly enough to offset the thickness of the hook when taking outside or inside measurements. The problem faced by Stanley Tools of New Britain was to put the sliding action in the hook, without making profits slide.

How to avoid the high cost of attaching the hook with screw machine fasteners was the question put to a TRS Engineer, trained in the PAR Process approach to assembly work. His answer saved 31% on fasteners and 8% on per-unit assembly time.

He demonstrated that the precision of standard TRS nickel-plated steel shoulder rivets would fully satisfy the needs of the job. Also, that the two rivets could be automatically fed and set in one operation by a standard TRS double-drive riveter.

Foreign rivets flopped on this job. Stanley was quick to pass the new cost-cutting trick on to their English plant. They shipped a duplicate TRS riveter over and tried foreign-made rivets, but without success. Now, TRS rivets are used in the English operation. TRS has the equipment, skill and quality control to assure reliable precision.



How Precision Slide is Achieved –

Precision-made shoulder rivets pass through oversize holes in rule hook and clinch to metal rule. Hook can slide back and forth by exactly the amount of excess diameter of holes in hook. The excess is equal to thickness of hook.

When you call in a TRS Engineer, you get rivets that save you the high cost of trouble and rejects. And, you get the benefit of an uncommon ability to come up with cost-reducing answers . . . the PAR Process way of simplifying and making assembly more automatic.

Don't Buy Riveting Machines until you learn how the TRS **PAR** *process revolutionizes riveting*

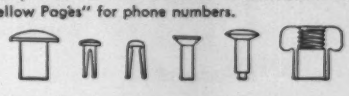
TRS®

TUBULAR RIVET & STUD COMPANY

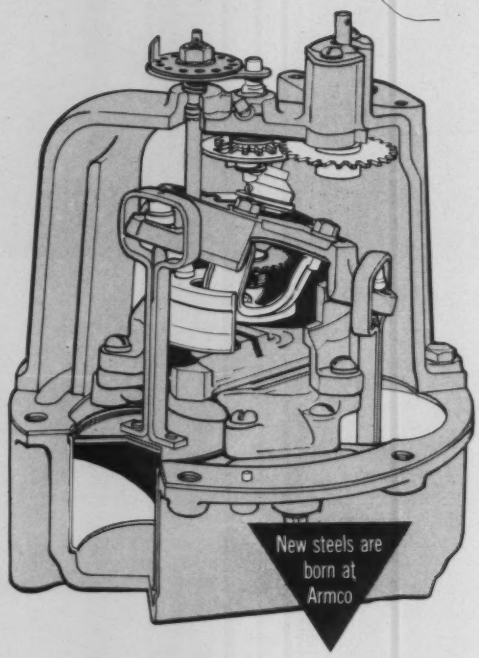
QUINCY 70, MASSACHUSETTS • **TRS** SALES OFFICES: Atlanta • Buffalo • Charlotte • Chicago Cleveland • Dallas • Detroit • Hartford • Indianapolis • Los Angeles • New York Philadelphia • Pittsfield • Quincy • St. Louis • Seattle. WAREHOUSE IN CHICAGO

See "Yellow Pages" for phone numbers.

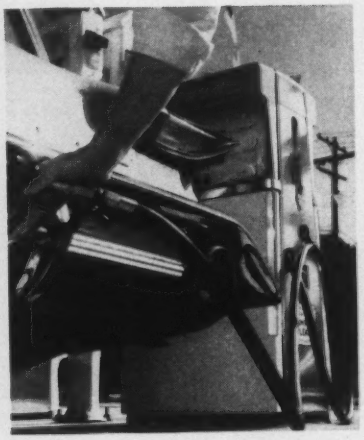
If it's a Tubular Rivet TRS makes it . . . and Better



DURABILITY OF ARMCO STAINLESS STEELS
Triples Life Expectancy of Tokheim "Miracle Meters"



Shown in white are the 21 parts of Tokheim's "Miracle Meter" that are made from stainless steel (Types 302, 303, 416, and 440 F).



Armco Stainless Steel is a prominent feature on handsome housings of all styles of Tokheim dispensers. The reasons: Beauty, durability, low maintenance.

ARMCO STEEL

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

Helps Dispensers Look Sleek, Work Reliably

Control center of each handsome Tokheim dispenser is the "Miracle Meter." Thousands of these faithful meters have measured gasoline with clockwork precision.

Now, Armco Stainless Steels add even greater dependability and accuracy to these finely-designed metering devices. Four individual stainless grades, carefully selected by Tokheim engineers, serve in 21 critical meter parts. The happy results are more-precise performance, positive reliability, and best of all —*three times longer life.*

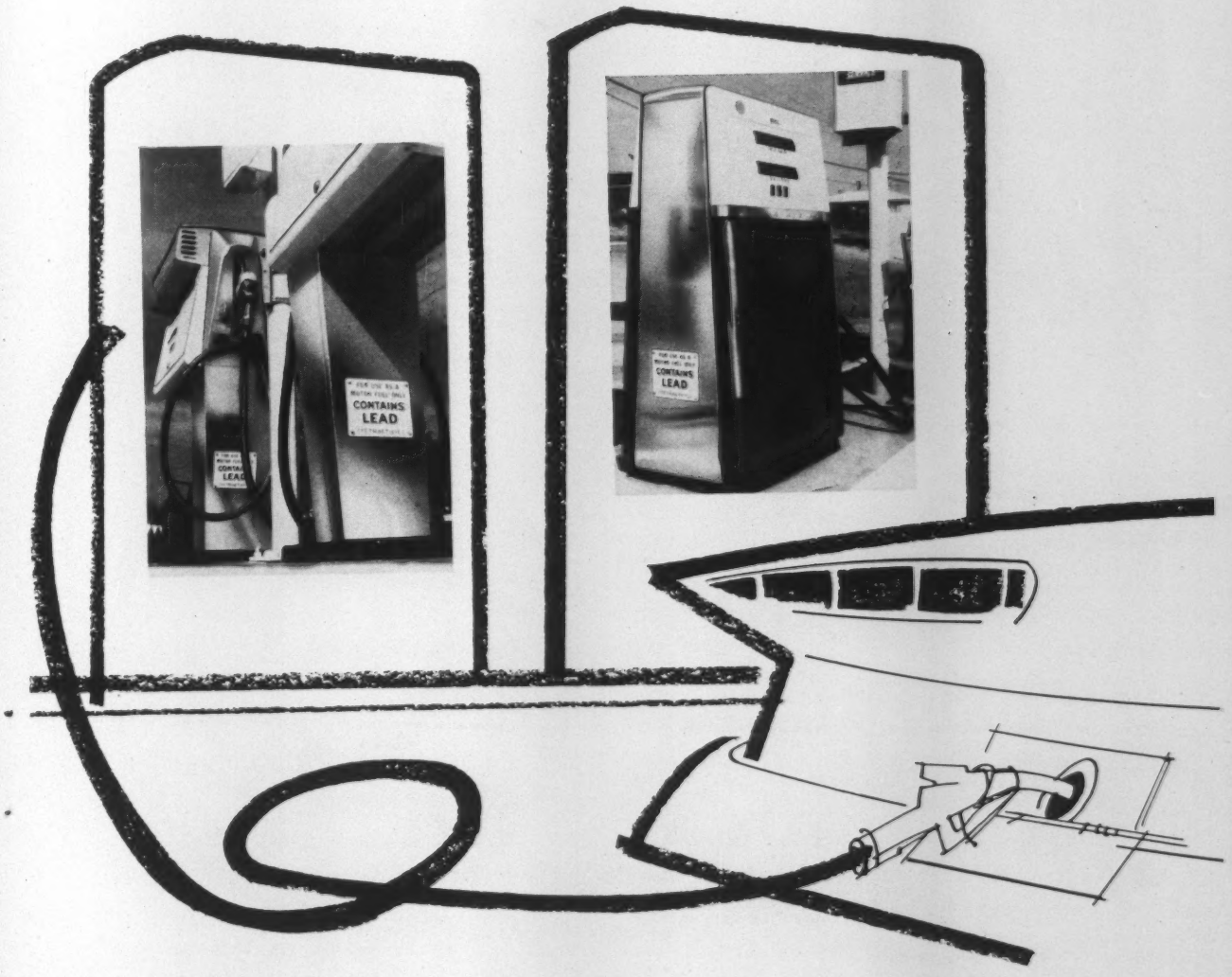
Stainless in pumps, housings

Stainless cylinders also help assure steadfast operation of dispenser pumps. Gleaming panels of Armco Stainless Steel defy corrosion and save maintenance on sleekly-styled dispenser housings. Inside and out, high-quality Armco Stainless Steels put extra life, beauty, and savings in modern Tokheim dispensers.

This is another example of an excellent product made even better with Armco Stainless Steels. Information we can give you about these special metals, in sheet, strip, bar and wire, may spark quality improvements in your products, too. Just write us or call your nearby Armco Sales Office or distributor of Armco Stainless Steels.

Stainless Steel

Point out durable, modern stainless with this symbol.



they turn in top performance to turn out top results

approved for better grinding

SIMONDS SNAGGING WHEELS

Better grinding evident in fast stock removal with less wheel wear! That's why Simonds Snagging Wheels get the nod of approval in leading foundries, steel mills and metal-working plants. Resinoid bonded wheels contain a special additive that provides an internal lubricant for better grinding action . . . and are identified by new short markings, A166-R, C16-S, etc. Vitrified bonded wheels for gray iron contain V9 Bond, a chemically designed glass bond for greater uniformity and consistently superior performance.

Write for Bulletin ESA-305

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ABRASIVE CO.
Tacony & Fraley Sts.
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Division of Simonds Saw and Steel Co.
COUNT ON / YOUR SIMONDS DISTRIBUTOR
FAST SERVICE • LOCAL STOCKS

WEST COAST PLANT: EL MONTE, CALIF.—BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO
SHREVEPORT—IN CANADA: GRINDING WHEELS DIVISION, SIMONDS CANADA SAW CO., LTD., BROCKVILLE, ONTARIO • ABRASIVE PLANT, ARVIDA, QUEBEC

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Silicone Materials

Solving problems with silicones is the subject matter of a one-page bulletin. A variety of uses of different silicone materials and ways that they can be used to solve plant operating problems are described in the bulletin. (General Electric Co.)

For free copy circle No. 1 on postcard

Electric Truck

Illustrated with engineering drawings, charts and photographs, a four-page folder describes a 2000-lb capacity electric truck. (The Elwell-Parker Electric Co.)

For free copy circle No. 2 on postcard

Spring Fasteners

Illustrated in a 13-page catalog are standard and special spring fasteners in twin-prong or cone-type impressions. Push-on types are also covered. Selection of fastener by style, screw or stud size is easy due to the arrangement of the data. (George K. Garrett Co., Inc.)

For free copy circle No. 3 on postcard

Self-Cleaning Filters

A 16-page catalog deals with self-cleaning filters. The catalog contains a complete listing of these all-metal, edge-type units. They do not require cartridge replacement. (The Cuno Engineering Corp.)

For free copy circle No. 4 on postcard

Commercial Glasses

Properties of 32 commercial glasses are detailed in a 16-page booklet. It contains information on several new glasses, as well as new sections on thermal expansion and optical properties. (For free copy, write on company letterhead to Corning Glass Works, Corning, N. Y.)

Design, Development

Varied services in research and development, engineering and fabrication are reported in an eight-page booklet. (Vacudyne Corp.)

For free copy circle No. 5 on postcard

Checks Temperature

Several new designs, in compact multi-point thermocouple selector switches, are reported in a four-page catalog. The catalog describes how these switches may be used for many temperature checking applications. (Thermo Electric Co., Inc.)

For free copy circle No. 6 on postcard

Engine Lathe

Fully illustrated and informative, a 12-page bulletin deals with an extra-heavy-duty engine lathe. Complete specifications are given. (Sidney Machine Tool Co.)

For free copy circle No. 7 on postcard

Turbo Blowers

Consisting of 124 separate models, a line of turbo blowers is described in a bulletin. Built to give continuous service, the blowers operate over a pressure range of 4.44 oz per sq in. (The North American Mfg. Co.)

For free copy circle No. 8 on postcard

Refractories

Told in a brochure are: What refractories are, the raw materials used to make them, how they are produced and how they serve industry. Special sections of the book discuss such technical topics as: source of raw materials, min-

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **11/17/60**

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No postage necessary if mailed in the United States

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THE IRON AGE
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Company .....

Co. Address .....

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FREE LITERATURE

ing of refractories and quality control from blasting to batching. (Harbison-Walker Refractories Co.)

For free copy circle No. 9 on postcard

Open Hearth Control

The adaptation of automatic control systems to 12 open hearth furnaces is described in case-history form in a 16-page bulletin. The bulletin graphically demonstrates how the controls can be successfully applied to older furnaces. (Hagan Chemical & Controls, Inc.)

For free copy circle No. 10 on postcard

Processing Equipment

Well illustrated, a four-page condensed catalog covers material-handling and processing equipment. (The Young Machinery Co.)

For free copy circle No. 11 on postcard

Insulating Materials

An up-to-date engineering chart details the commonly-used plastic and ceramic insulating materials. The four-page leaflet also includes a listing of the Fahrenheit temperature limits for 88 materials. (Mycalex Corp. of America)

For free copy circle No. 12 on postcard

Storage Racks Adjust

Steel storage racks are described in a data sheet. The racks have a positive locking feature. Dimensions of vertical and horizontal frames are given. (Aacon Unitary Storage Equipment Co.)

For free copy circle No. 13 on postcard

Air Cylinders

With technical information, a circular illustrates a complete line of non-rotating air cylinders. The cylinders have a large center hole for operating air and collet chucks. Principles of operation and construction are explained. (Powergrip, Inc.)

For free copy circle No. 14 on postcard

Belt Slings

Describing a complete line of synthetic web belt slings, a brief brochure contains useful information about both nylon and Dacron slings. Data shows the resistance to all common agents. Charts list dimensions and capacities of synthetic slings in vertical, choker and basket applications. (Jones & Laughlin Steel Corp.)

For free copy circle No. 15 on postcard

Punch Sizes

Describing the firm's new concept of proven usage punch sizes, a folder points up the lack of standardization for punch point sizes. The eight-page catalog presents detailed information with respect to specifications, materials and engineering data. (Dayton Perforators, Inc.)

For free copy circle No. 16 on postcard

Metal Connector

Flexible metal connectors are illustrated and described in a catalog. Complete specifications are also included. (Cobra Metal Hose)

For free copy circle No. 17 on postcard

Dynamic Balancers

Up-to-date, a two-page catalog sheet describes the various company balancing machines. The different models are outlined with specifications and pictures. Full technical details regarding their operation are included. (Micro-Balancing, Inc.)

For free copy circle No. 18 on postcard

Testing

A four-page bulletin describes many new machines and test methods for all industries. (Testing Machines, Inc.)

For free copy circle No. 19 on postcard

Tubular Products

Those connected with the design, manufacture or purchase of equipment involving the high temperature application of tubular products will be interested in this new brochure. The six-page folder contains information on 15 steels widely used in high temperature service. (The Babcock & Wilcox Co.)

For free copy circle No. 20 on postcard

Sheet Metal Tester

Compact and versatile, a sheet metal tester is presented in a 5-page foldout brochure. The machine simulates actual deep drawing press operations in the laboratory. Listed in the brochure are the principle types of tests the machine is capable of performing. Included is a picture of the unit and a description of its operation. (Tinius Olsen Testing Machine Co.)

For free copy circle No. 21 on postcard

Consistent Quality Has Benefits for You

The reputation of Roebling high carbon flat spring steel is based on two uncompromising facts: its unexcelled dimensional and mechanical uniformity.

They are qualities that contribute immediately and directly to *your* increased production rates and decreased rejects.

You are taking advantage of a collection of benefits when you specify Roebling. Write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey, for complete information.

Roebling high carbon flat spring steel is used for a wide variety of parts.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

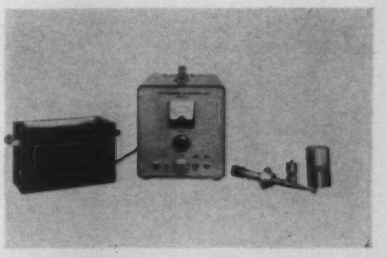
pure nickel for critical alloying

When the specifications call for *pure* nickel, you can count on Sherritt as a reliable source of supply. Sherritt's unique hydrometallurgical refining process yields nickel powders with a purity of 99.9%. This high-purity nickel comes to you in handy briquettes and in three grades of powder for faster, easier alloying. The low chilling property of Sherritt briquettes and powders makes them particularly desirable for alloying additions at the end of the heat. Special nickel grades and coated powders are also available. FOOTE MINERAL COMPANY *is the exclusive sales agent for Sherritt nickel and cobalt in the United States and Canada. For complete illustrated brochure with prices and delivery information, contact the Foote Mineral Company, 438S Eighteen West Chelten Building, Philadelphia 44, Pa.*

SHERRITT GORDON MINES LIMITED

New Materials and Components

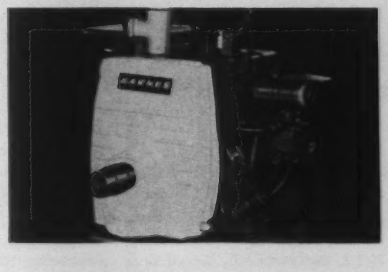
Ultrasonic Generator Fits Wide Application Range



Compact and highly-flexible, a 100-w ultrasonic generator has connections for any of ten output impedances. The units come in any nominal frequency from 10-100 kc or greater. Wide range of output values suits the unit to ultrasonic welding, soldering, splicing and sealing of metals. It can also be used for ultrasonic cleaning and drilling. Power output is continuously variable from zero to full power, (International Ultrasonics, Inc.)

For more data circle No. 25 on postcard, p. 165

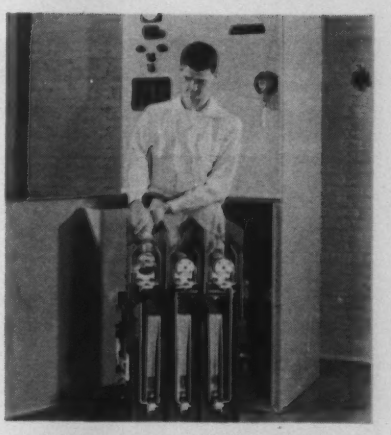
Multi-Stage Pumps Offer High-Head Performance



Electric or gasoline powered, multi-stage utility pumps have a large capacity. These power-packed pumps deliver up to 3200 gph. They boast extra pressure up to 60 psi. Quad volute insure quick and positive self-priming. The pumps have a compact, heavy-duty close-coupled capacitor motor or engine. The former is electric; the latter is gasoline driven. Bronze impellers and check valves resist corrosion. (Barnes Mfg. Co.)

For more data circle No. 26 on postcard, p. 165

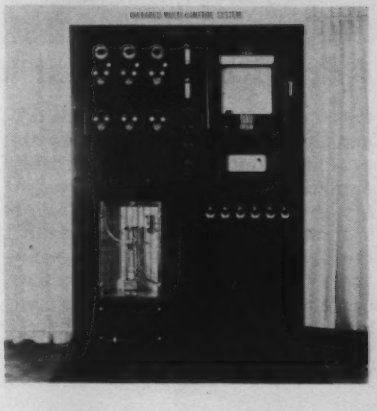
Contractor Sets Pace for New Control Design



High-voltage, control center control line is possible through the successful development of a high-voltage air-break contactor. The contactor is a nucleus around which a functional controller is created. The contactor uses the new glass polyester Super Pyro-Shield insulation. All insulation in contact with high-voltage current-carrying parts is flame retardant and track resistant. Proper proportioning of glass polyester, aluminum and steel brings about a 400-amp, 5-kv, 50-milli-volt-ampere contactor in the new compact design. The contactor design provides faster and easier inspection. No special tools are required. The simplified mechanical design has a vertical stroke and double-break contacts with floating guides for trouble-free operation. The contactor retains the proven advantages of 45° contacts. (Allis-Chalmers Mfg. Co.)

For more data circle No. 27 on postcard, p. 165

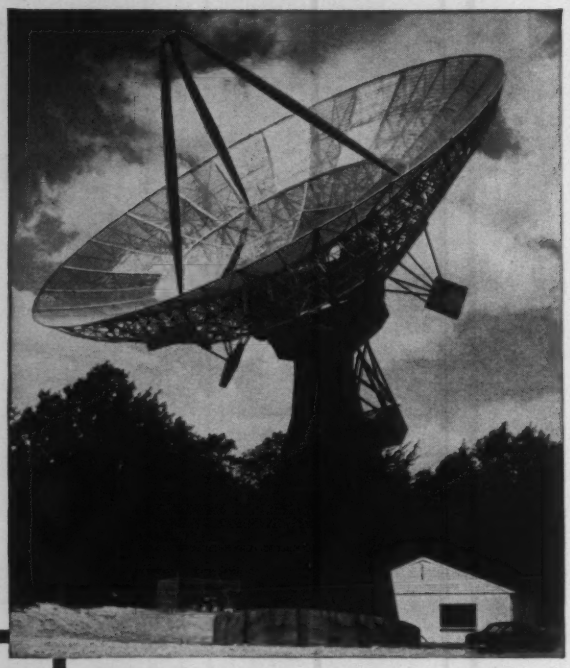
System Controls Heat-Treating Atmospheres



Applying the infrared principle to the measurement of gas compounds, a multi-control system monitors as many as six points of CO, CO_2 or CH_4. The pattern of absorption of each compound differs with the molecular structure. The amount of infrared radiation absorbed is proportional to the concentration of the gas compound. The equipment consists of: a multi-point recorder; a floating-action-type proportioning control unit; an infrared analyzer. Also included are the necessary control point setter and push-button valve control stations. All the equipment is piped and wired on a steel panel 48-in. wide x 72-in. high. The equipment requires little maintenance. It can be readily calibrated and is practical to operate in a production heat treat. (Leeds & Northrup Co.)

For more data circle No. 28 on postcard, p. 165

One rpm per day



CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

It takes real accuracy in gearing to turn an 84-ft. radio telescope at that speed. Backlash on the Cone-Drive **double-enveloping worm** gear set used in the complex drive system was held to 0.0012-inch.

Dependable Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

Added capacity at lower cost

Putting standard Delta 11" metalworking lathes on the job expanded the capacity of the lathe department at the Armaments Division of Universal Match Co., St. Louis, at surprisingly low cost. And, according to shop men, the Delta lathes work right alongside—and keep up with—costlier, heavy duty equipment. In addition to lowering initial tool investment, Delta lathes provide savings in set-up and operating time and greatly reduced maintenance.

This is another example of how thousands of metalworking plants are using rugged, versatile and highly accurate Delta Industrial Tools to supplement or replace special purpose machines. Write for free, 64-page illustrated booklet of cost cutting ideas: Rockwell Manufacturing Company, Delta Power Tool Division, 640L, Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ont.

DESIGN DIGEST

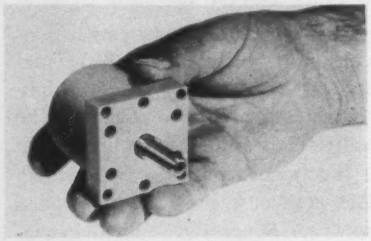
Finishing Tools

A line of precision power finishing tools for industry can be used in many industrial finishing operations now being performed by other methods. In wheel diameters of 4 to 12 in., the new tools combine the efficiency of blended, straight wire cutting points, encapsulated in a plastic bond to precisely control finishing action. Peening or rolling of metal edges is kept to an absolute minimum and, in many cases, is entirely eliminated. Edge blends can be held to very close tolerances. (The Osborn Mfg. Co.)

For more data circle No. 29 on postcard, p. 165

Midget Actuator

Having a body 2-in. square and 2-in. long, a midget actuator operates by hydraulic or pneumatic pressure. It produces reciprocating rotary movement. The single vane model produces rotation in a maximum arc of 270 degrees. Movement of the double-vane model is



restricted to 90 degrees. However, power is more than doubled. (Ex-Cell-O Corp.)

For more data circle No. 30 on postcard, p. 165

Infrared Burner

Gas-fired, an infrared burner was designed specifically for low-temperature industrial processing applications. Such applications are: drying metals; curing shell molds and foundry cores; drying porcelain-enamel frit, drying moist fabrics, and paint and enamel baking. Infrared radiant heat emission of the new burner is concentrated in the 2.0 to 4.0 micron band. The burner is designed for optimum heat transfer efficiency. Face temperature of the 4- x 18-in. burner screen

may be regulated up to 1800°F; nominal heat input is 30,000 BTU/hour per unit. Units have built-in flame adjustment. Burners have cast-iron integral manifolds, and can be assembled into continuous lines up to 100 ft long. (Bryant Industrial Products Corp.)

For more data circle No. 31 on postcard, p. 165

Monitors Temperature

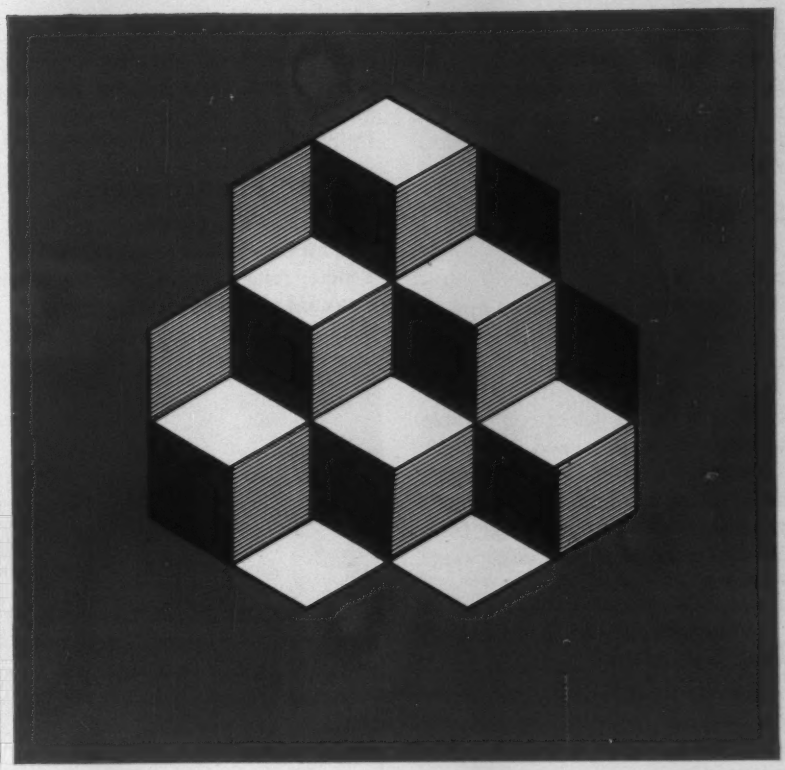
Thermocouples as long as 10,000 ft may be used for temperature indication and control with an all-transistorized instrument. The panel-mounting, dc electronic volt-

meter operates on signals that become too small to actuate an ordinary pyrometer, after they encounter the resistance of long thermocouples. Chopper-stabilized, the instrument needs no zero adjustment after it has been set at the factory. The instrument has an input resistance of at least 100,000 ohms—or 2000 times the resistance of an ordinary pyrometer. (Metronix, Inc.)

For more data circle No. 32 on postcard, p. 165

Dry-Type Transformers

In single and three phase construction, a standardized line of dry-type transformers is primarily for indoor installation. The new line is designed to deliver quiet, economical performance in plants. Each model is design-checked to operate at 4 to 5 decibels below new 1960 NEMA standards. All core and coil assemblies are thoroughly tested to conform to both NEMA and ASA specifications. The transformers occupy minimum space. Terminal arrangements and liberal wiring area permit primary and secondary cable entrance from either end of the enclosure. Terminals are de-



TAKE A SECOND LOOK! Are you getting FULL Value for your Abrasive Dollar?

Count the cubes in the figure. You'll see six or seven, depending upon your point of view. Consider the total value of your present abrasive, and compare it with the proven value of Wheelabrator Steel Shot. Not just in price, but in abrasive consumption, cleaning speed, cleaning quality, and equipment maintenance costs as well. From any point of view, the proven quality of Wheelabrator Steel Shot adds up to extra value and extra profit.

Write today for this new handbook of blast cleaning abrasive performance. It's full of charts and facts you can use to help cut abrasive consumption, reduce cleaning costs. Write to Wheelabrator Corp., 510 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 409, Scarborough, Ont.

WHEELABRATOR
STEEL ABRASIVES

signed for connecting copper or aluminum cables. (Niagara Transformer Corp.)

For more data circle No. 33 on postcard, p. 165

Safety Switches

Heavy-duty and heavy-duty interrupter switches are capable of withstanding the tremendous energy of a 200,000 amp short circuit. This is possible when used with the manufacturer's high-capacity or other current limiting fuses of comparable characteristics as defined in NEMA standards FU1-1959. Employing silver alloy, refractor-type contacts, the switches come in ratings from 30-600 amp, 250 and 600 v ac. (General Electric Co.)

For more data circle No. 34 on postcard, p. 165

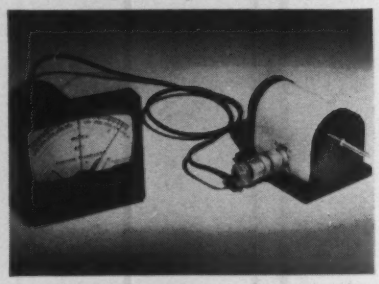
Die Cushions

In sizes from 8-16 in., pneumatic die cushions are primarily designed and constructed for press bed mounting with the minimum overall height, eliminating the punch press pit in most cases for a given power press. (The Dayton Rogers Mfg. Co.)

For more data circle No. 35 on postcard, p. 165

Linear Transducer

Offered in combination with either a conventional panel meter or a meter relay, a transducer forms a measuring or controlling system. Such a system provides the best



matching of sensing and monitoring units. No specialized electrical engineering is required to use the system. The transducer converts a linear position to a signal that reads out on a meter. The signal need not be amplified. The transducer is best suited to measuring deviations of a few thousandths of an inch from mechanical null. Sensitivity of the transducer system, as indicated on the meter, is ± 0.005 in. full scale. (Assembly Products, Inc.)

For more data circle No. 36 on postcard, p. 165

Conversion Coating

For either zinc or cadmium plate, a leach-type clear chromate conversion coating is a dry acid salt. It is dissolved in water and nitric acid to produce clear white bright, clear blue bright or iridescent bronze chromate coatings. It produces these coatings on zinc or cadmium plate or zinc die castings. (MacDermid Inc.)

For more data circle No. 37 on postcard, p. 165

Precision Switches

Withstanding oil, moisture and dust, sealed, heavy-duty precision switches have a silicone boot that

EXECUTIVE REPORT #31

WHY BLAST CLEAN DIE CASTINGS?

Scores of die casting manufacturers are using Wheelabrator airless blast cleaning for these reasons:

1. Impart uniform surface that is ideal for final coatings.
2. Reveal defective parts by raising laminated areas.
3. Reduce porosity as a result of the peening action imparted.
4. Removal of light flash and sharp edges on heavier flash.
5. Deburring of machined die castings.

A prominent manufacturer of aluminum die cast outboard motor components reports that they would not consider processing their die castings without first Wheelabrator blasting prior to machining, inspection, etc.

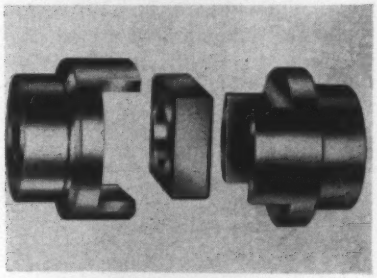
Write today for complete information to Wheelabrator Corp., 510 S. Byrkit Street, Mishawaka, Indiana. In Canada, P.O. Box 490, Scarborough, Ontario.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

provides a flexible seal between the case and the operating pin. They also have a permanent seal between the base and cover of the switch case. The switches are for single-pole, double-throw operation at 2 hp, 250 v ac; 1 hp, 125 v ac; 20 amp, 125 v ac. The switch is 11/16-in. wide, 1-15/16 in. long, 13/16-in. high. (The W. L. Maxson Corp.)

For more data circle No. 38 on postcard, p. 165

Flexible Coupling



Self-lubricating, jaw-flange flexible couplings use a specially-designed oil-impregnated center member made of sintered steel. Through unusual capillary action, the center member absorbs and retains high-grade lubricating oil for long periods. It dispenses it to bearing surfaces as needed. The units have greater torque and load-carrying capacity with attending longer life. (Zurn Industries, Inc.)

For more data circle No. 39 on postcard, p. 165

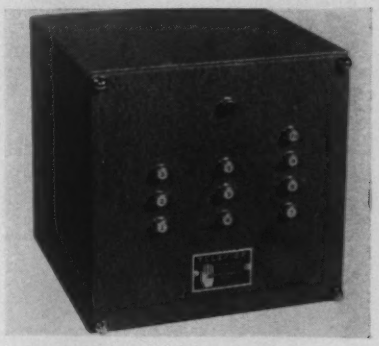
Horizontal-Force Mount

A mount isolates shock and vibration produced by machinery whose operation develops mostly horizontal forces. Such machinery includes cold headers, shapers and horizontal compressors. It handles up to 4000 lb per mount. (Barry Controls)

For more data circle No. 40 on postcard, p. 165

Numerical Readout

Reducing downtime costs, a remote readout device provides instant numerical indication. This indication shows exact burner position when a flame failure or other fault occurs in multi-burner gas-operated heating systems. The direct-reading flame-fault indicator instantly scans all burner circuits to



pinpoint the exact trouble spot. It then telegraphs the correct signal to the numerical readout indicator. (Protection Controls, Inc.)

For more data circle No. 41 on postcard, p. 165

Digital Comparator

Transistorized, a digital comparator compares two binary or binary coded decimal inputs. It provides output positioning commands. The unit is designed for use in control

EXECUTIVE REPORT '32

$40,000 Annual Saving in Weldment Cleaning

Towmotor Corp. saved $40,000 a year on weldment cleaning with Wheelabrator airless blast cleaning. Removing scale, welding flux and spatter from lift truck components with the Wheelabrator resulted in these benefits: Manual wire brushing and sanding were eliminated. Descaling time was reduced by one half to two-thirds. Paint adheres better to the blast-cleaned surface, and product quality was improved by exposing sub-standard welds.

LET US PROVE THE SAVINGS

. . . we will gladly show you the results of Wheelabrator airless blast cleaning on your particular parts, including a demonstration in our customer-service laboratory. Write to Wheelabrator Corp., 510 S. Byrkit St., Mishawaka, Indiana. In Canada, P.O. Box 490, Scarborough, Ontario.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

American Metal Turnings Crusher

. . . increases profits . . . improves handling

An almost fully automatic chip salvage system, with an American Metal Turnings Crusher at its heart has increased profits, saved space, and improved housekeeping at a ball bearing plant, conveyors service two rows of automatic screw machines and feed a cross-over conveyor. The cross-over conveyor feeds turnings directly into an American Metal Turnings Crusher which reduces the turnings to uniform sized chips. From the crusher chips are conveyed to a hopper to be periodically discharged into a chip-wringer to reclaim cutting oil. Dry chips drop into a discharge hopper and feed into an air duct which pneumatically conveys the chips to a storage bin at the rail siding.

Literature on American Metal Turnings Crushers is yours for the asking.

American PULVERIZER COMPANY

ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

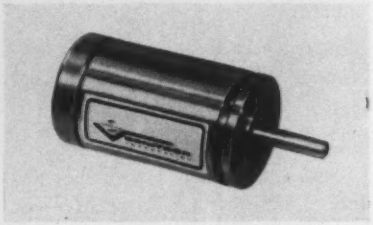
1439 MACKLIND AVE. ST. LOUIS 10, MO.

systems. It may be used directly for comparison of contact inputs, voltage-vs-contact inputs or voltage-vs-voltage inputs. Designed to operate at ambient temperatures of —49°F to +131°F, the unit is 7-in. high, 19-in. wide and 11-in. deep. (Datex Corp.)

For more data circle No. 42 on postcard, p. 165

Control Synchros

High accuracy and stability over the temperature range from —55° to +125°C, are among the unusual features of control synchros. Maximum electrical errors of ±5, ±7

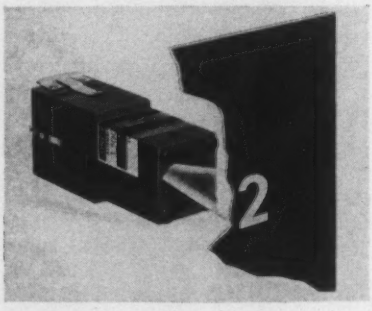


and ±10 minutes can be specified for all synchros with standard 11.8-v input; as well as synchro transmitters with 115-v input and 11.8-v output. (Vernitron Corp.)

For more data circle No. 43 on postcard, p. 165

Digital Readout

Sub-panel mounted, a small digital readout is accessible for replacement. Mounted 13/16 in. behind a lucite viewing screen, the readout rear-projects the digit onto the viewing screen. The viewing screen



is not an integral part of the readout and may be quickly swung out of position. Digits are visible from any angle of viewing and are uncluttered by mounting holes or other detail on the front of the readout. Quantity units may be mounted be-

hind a large viewing screen, and only those digits which are desired will be seen on the screen in the position determined by the placement of the digital readout behind the screen. The readout is designed for use with digital computers, control equipment, instruments, aircraft equipment, production and inventory controls. (Industrial Electronic Engineers, Inc.)

For more data circle No. 44 on postcard, p. 165

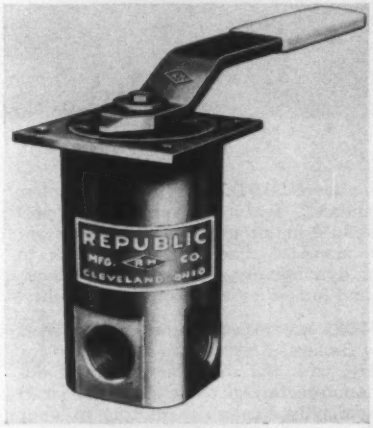
Oil Filter Element

For 750 and 500 cu in. by-pass type filters, an oil filter element features special construction for extra strength and rigidity. It also boasts high-quality media for a uniform, efficient filtration, and extra large perforations for uniform oil flow. This element contains no additive removing chemicals, and it is, therefore, ideally suited for compound oils. (Cummins Engine Co., Inc.)

For more data circle No. 45 on postcard, p. 165

Self-Cleaning Valve

Having a working pressure of 10,000 psi, a valve is made in two-way, three-way and four-way models with closed and open centers. It withstands 15,000 psi surge. Its burst pressure is over 30,000 psi. The valve has one-piece stainless-



steel body construction, with non-corrosive internal parts. Valve is for air, water and oil services. Low-torque sliding seals and selector disk are stainless steel, honed optically flat for tight sealing. Seals are wear compensating. The valve is

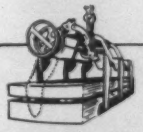
He's lifting 5 tons with 1 finger

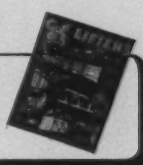
Speed Handling...

Increase Storage Capacity with a C-F Lifter

Here's 1 man—a C-F Lifter and an electric hoist handling 5 ton packs of sheet steel with speed, safety and economy. One C-F Lifter handles a wide range of sizes . . . adjustments are made by the operator in a few seconds, permitting the Lifter to shift from wide to narrow sizes in a few seconds. Made in capacities from 2 to 60 tons.

Bulletin SL-28 shows you how to cut handling costs. Write for it today.





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REPAIR DAMAGED VACUUM MELTING CRUCIBLES

SAVE TIME AND MONEY

Zak offers experienced service in the repair of crucibles and ingot molds damaged through handling mishaps or other causes.

Typical customer comment has been—"we saved money—down time was cut — our crucible was back in production ahead of schedule."

For service call:
Troy **ARsenal 3-3912** *and save!*

Manufacturers and Fabricators of:
- VACUUM FURNACES
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- SKULL MOLDS
- VACUUM CRUCIBLES
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- INGOT MOLDS (STEEL AND COPPER)

FOR RESEARCH OR PRODUCTION

Send for descriptive literature:
B6UO-2 Button Furnace • Cr-58 Crucible • FAC-58 Facilities Folder • IM-59 Ingot Molds • HT-59 Hot Topping Unit

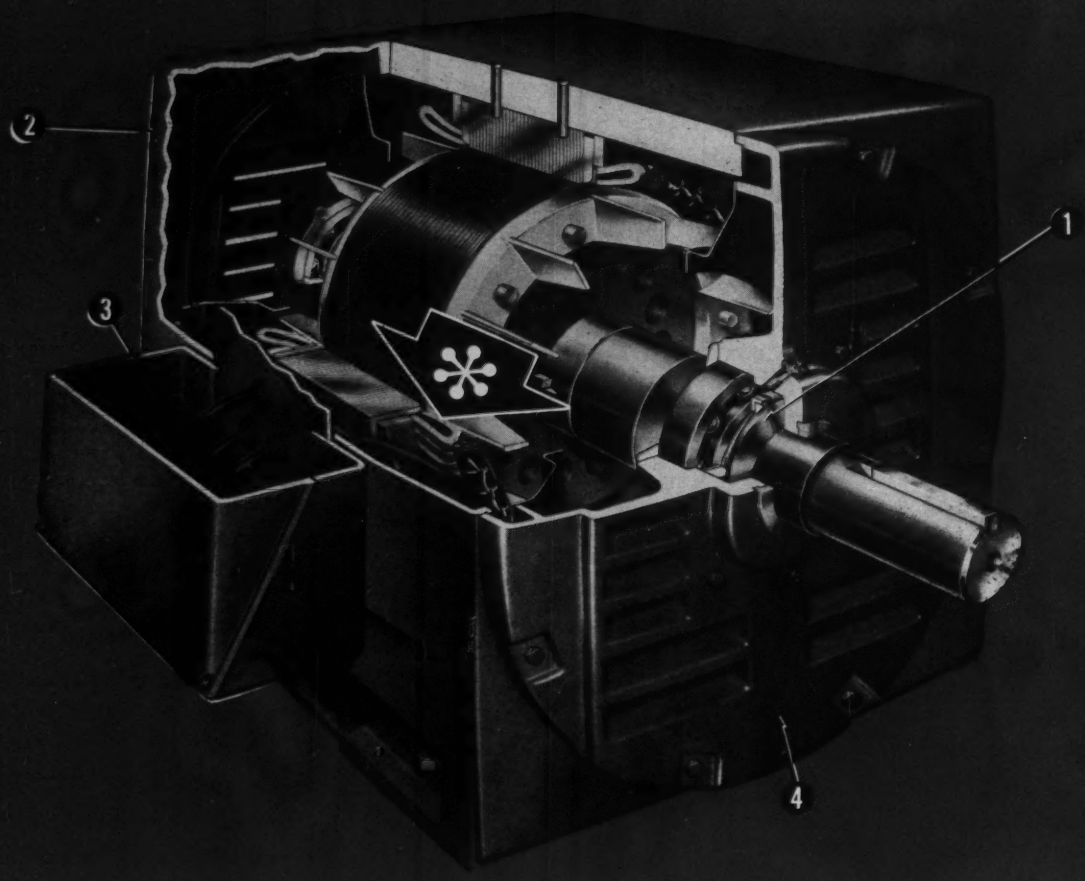
"Engineering Manufacturers for Industry"

ZAK MACHINE WORKS, INC.

TROY (GREEN ISLAND) NEW YORK

General Electric's CUSTOM '8000'* means . . .

MOTORS CUSTOM DESIGNED FOR THE METALWORKING INDUSTRY



1 NEW "POSITIVE-PURGING" BEARING SYSTEM utilizes a rotating slinger to purge bearings of old grease and inhibit grease seepage along the shaft. Readily accessible grease fitting cuts maintenance time.

2 RUGGED CAST IRON FRAME is built to give maximum protection on toughest jobs—frames are factory tested to withstand shocks in the magnitude of 20G. Shaft diameters have been increased in size to provide the strength and rigidity demanded by tough metalworking applications.

3 EXTRA LARGE CAST IRON CONDUIT BOX simplifies installation and maintenance.

4 NEW, FLAT, CAST IRON END SHIELDS are designed for durability, yet offer the lightweight, easy removal features which can cut hours and dollars from your maintenance schedules. Angled louvers assure both the effective protection and the maximum ventilating efficiency demanded of motors for metalworking applications.

IN ADDITION TO THE SPECIAL METALWORKING MOTOR FEATURES mentioned above, CUSTOM '8000' motors offer these superior "standard" features: replaceable prewound stator cores reduce maintenance costs; frames are designed to NEMA standard mounting dimensions to simplify installation; dynamically balanced, cast aluminum rotor windings and fan provide maximum reliability.

CUSTOM '8000' MOTORS are manufactured to the rigid quality specifications General Electric has adhered to for over 80 years. Today, with the implementation of advanced design and manufacturing techniques, G.E. can accurately and economically *Customize* motors to your specific requirements through utilization of motor components engineered exclusively for metalworking applications.

* *Trade-mark of General Electric Co.*

MEDIUM AC MOTOR AND GENERATOR DEPARTMENT

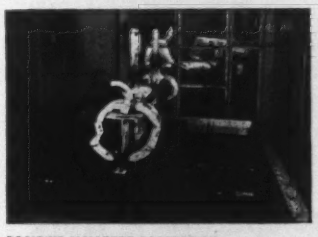
GENERAL ELECTRIC

EXCLUSIVE

POLYSEAL* INSULATION SYSTEM LENGTHENS MOTOR LIFE

General Electric's new Polyseal supported silicone rubber insulation system is highly resistant to contaminants and abrasion—gives maximum winding protection for rolling mills, auxiliaries, punch press and equally tough metalworking applications.

The Polyseal system assures superior mechanical, thermal, voltage and environmental endurance. This form-wound insulation is a vulcanized system "built-up" from silicone rubber tape reinforced by a glass and Dacron† fabric. Polyseal both retains its resilience and provides a positive seal against moisture and contaminants.



POSITIVE MOISTURE PROTECTION is assured by "under water" production line tests. For example, 2300-volt, form-wound Polyseal coils are water soaked for one-half hour—then "hi-potted" at 8000-volts while still completely immersed—to prove the insulation system is absolutely sealed.

† *Registered Trade-mark DuPont Co.*

CALL YOUR GENERAL ELECTRIC APPARATUS SALES OFFICE

for full information on CUSTOM '8000' motors for the metalworking industry, or write for Bulletins GEA-6865 and GEA-6889, to Section 884-13, General Electric Company, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

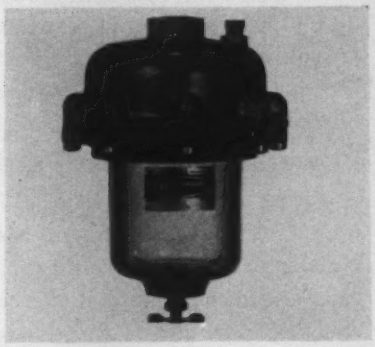
DESIGN DIGEST

self cleaning as seals wipe across the selector disk. (Republic Mfg. Co.)

For more data circle No. 46 on postcard, p. 165

Visible Drain

For attachment to any drain, sump or line that needs periodic draining, a drain has a transparent bowl. The bowl has a drain cock in the bottom. It provides a visible sump which, when full, can be manually drained. The drain has no

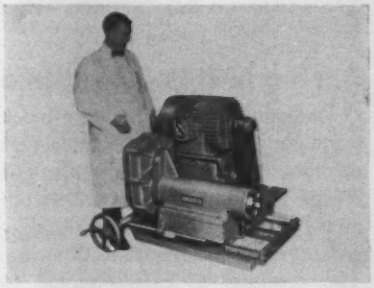


mechanism to foul. It requires only one connection. It can be threaded onto any tank outlet or to any line, using reducers or bushings, if necessary. Overall height of the drain is 6¾ in. It is 5 in. in diam at the widest point. (Wilkerson Corp.)

For more data circle No. 47 on postcard, p. 165

Milling Spindle

Produced for the spindle manufacturer and the original equipment manufacturer, a milling spindle and slide assembly unit performs the major cutting operation. It does



this on a special milling machine for milling the curvature in steel mill rolls. The rolls remain mounted in their respective housings, without dismantling. The rolls are driven and the machining operation is done in one rotation of the roll. Depths of cut vary from a light finish cut to a maximum of about 0.125 in. The rolls are milled in pairs. This 20-hp motorized assembly has seven speed changes from a minimum of 70 rpm to a maximum of 450 rpm. (The Standard Electrical Tool Co.)

For more data circle No. 48 on postcard, p. 165

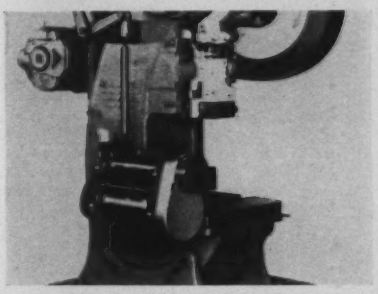
Variable-Speed Drive

Every revolution per minute between 180 and 1800 is obtainable from a variable-speed drive unit. Using a 1200 rpm motor, all speeds beween 120 and 1200 are possible. Either dripproof or totally-enclosed fan-cooled units can be furnished, in ½, ¾ or 1 hp. The incorporation of a four-speed transmission results in three times greater torque at the low speeds. A simple control regulates the output shaft to the desired revolution per minute. (The Lima Electric Motor Co., Inc.)

For more data circle No. 49 on postcard, p. 165

Roll Feed

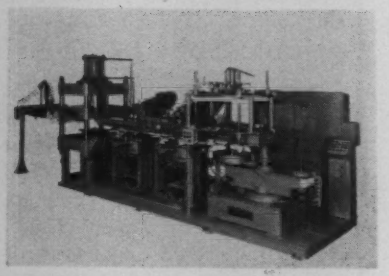
Featuring greater feeding accuracy, a precision roll feed offers increased pulling power. The new design incorporates a long-life cam clutch which transmits greater torque with reduced wear and high repetitive accuracy. The lower feed roller is a full 3⅞ in. diam, producing a nominal 3½-in stock travel



with less than ⅓ of the roller circumference. Strong spring pressure adjusts and maintains roller pressure. A brake prevents coasting of the feed rollers. Other features include: roll lifter; needle bearings on rollers; a reversible clutch for feeding in either direction. (Benchmaster Mfg. Co.)

For more data circle No. 50 on postcard, p. 165

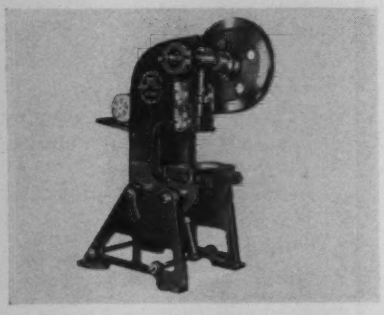
New Equipment and Machinery



Transfer System Performs Handling Operations

Paying for itself in two years, a stator, rotor notching and parting system is completely automatic. It holds and stores disks; transfers disks to stator notching press; transfers disks to rotor notching press and then transfers disks to parting press. It then stacks the finished parts. With this system, it is unnecessary to change spindles. The unit eliminates skid stacking and out-of-parallel stacks. Its unloading arm is air actuated. (Automation Machines & Equipment Co., Inc.)

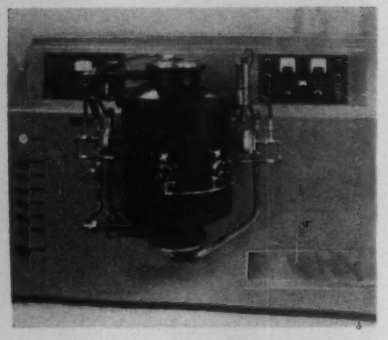
For more data circle No. 55 on postcard, p. 165



Power Punch Press Features Large Die Space

Having a standard stroke of 2½ in., a 25-ton power punch press has a die space of 7⅜ in. shut height and 8-in. throat. The press can be easily set up for any standard punch press operations. Such operations include: blanking, forming, shearing, riveting, drawing, cutting and crimping. The press has a reliable single pin, knife-type clutch. It can be easily changed from repeat to non-repeat action. Adjustable V-type ram gibs are a full 14-in. long. Die bed is 12 x 21 in. with opening in bed of 5 x 8 in. Press can incline 30°. (Alva Allen Industries)

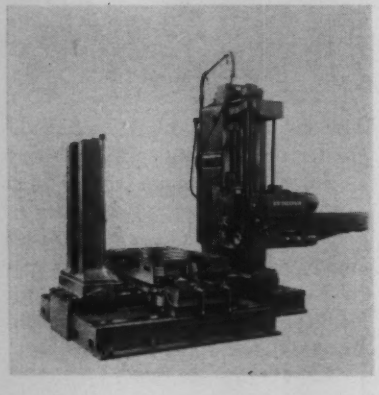
For more data circle No. 56 on postcard, p. 165



Furnace Accommodates High-Temperature Work

A pyrolytic development furnace is useful for ultra-high temperature operation—up to 3000°C continuous service. Its general application is for high-temperature work under vacuum, controlled reducing or inert atmospheres. Specifically, it is designed for work with pyrographite or other new pyrolytic materials. The water-cooled stainless steel furnace contains only various forms of carbon for insulation. It also consists of the company's unusual split graphite element, with a hot zone of 4-in. ID x 8-in. high. Pyrometric measurement and observations are made through several shielded and cooled sight ports. (Vacuum Specialties Co., Inc.)

For more data circle No. 57 on postcard, p. 165



Boring Mill Is Capable of Using Tape Controls

Designed on the building-block principle, a 4-in. spindle table-type machine bores, drills and mills. The boring mill uses the latest developments in both numerical positioning control and numerical contouring. The machine is ideally suited to tracer controls. It comes with combination selective pendant and hand shift control; and also with complete pendant control. Feeds and speeds are each automatically shifted hydraulically. This is done by means of trouble-free selector valves mounted on the head. There are 27 spindle speeds; 12 spindle feeds; and 24 feeds to the saddle, head and table on the machine. All drive gears are made from forgings and are hardened. Sliding-way surfaces on the head are lined with non-metallic inserts. (The Cincinnati Gilbert Machine Tool Co.)

For more data circle No. 58 on postcard, p. 165

Silicone-Resin Paper

An asbestos and silicone resin paper, with no organic binders of any kind, is suitable for operation at Class C temperatures (180°C). Electrical properties are not impaired by exposure to 275°C for 450 hours. The asbestos itself is satisfactory for applications requiring resistance to considerably higher temperatures. The paper comes in gages from 0.0025 to 0.0065 in. The concentration of the silicone resin impregnation is about 60 pct. (Raybestos-Manhattan, Inc.)

For more data circle No. 59 on postcard, p. 165

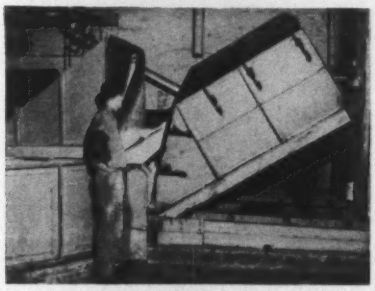
Alkaline Stripper

In a simple soaking operation, an alkaline-solvent compound strips acrylic, alkyd and other resistant paint finishes. It may be used in ordinary steel tanks, is safe on steel magnesium, and inhibited against attack on aluminum, zinc and brass. It has no flash point and contains no phenolics. A wax seal on the surface of the compound retards evaporation, increases life of the stripper. (Oakite Products, Inc.)

For more data circle No. 60 on postcard, p. 165

Platform Lift

Two oil-hydraulic power cylinders are used in an elevating platform lift. The basic power cylinder underneath a hopper-type super-



structure has a lifting capacity of 4000 lb. The lifting stroke is 11 ft. Lifting speed is about 20 fpm. The lift raises, tilts and dumps its load. (Globe Hoist Co.)

For more data circle No. 61 on postcard, p. 165

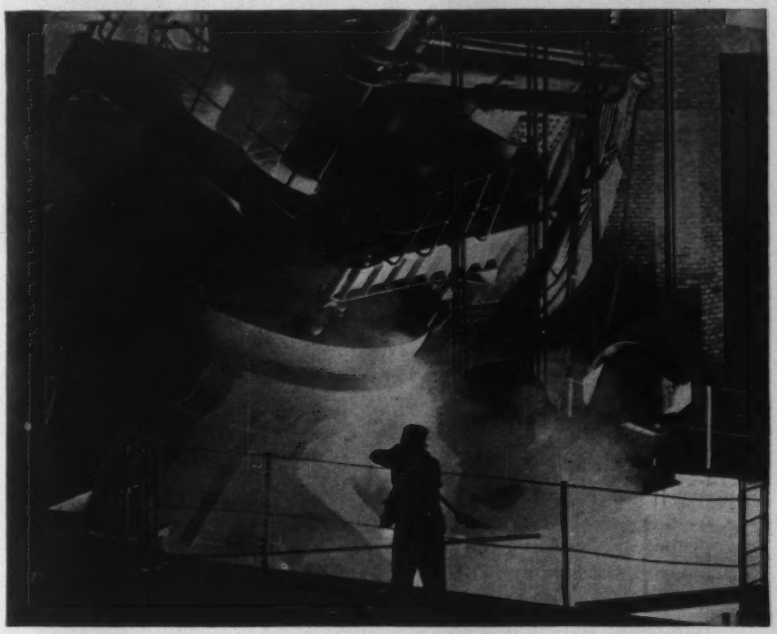
Mounts Samples

A press offers convenient and rapid mounting of metallurigcal samples in transoptic or bakelite material. The hydraulic system is an integral part of the sturdy basic structure. The molding tools, 1 and 1¼ in. ID, are readily interchangeable. Center ejection with automatic mold base retraction is featured. (Buehler Ltd.)

For more data circle No. 62 on postcard, p. 165

Oscillograph

Oscillographic recording in a variety of locations is made easier by a mobile model two-channel oscillograph. This complete recording system uses plug-in interchangeable style preamplifiers. It is housed in a 35-in. high wheel-mounted gray steel cabinet. This cabinet permits easy movement between rooms or into and out of elevators. The complete two - channel recording mechanism, with low impedance, enclosed galvanometers, uses the heated stylus method to produce immediately visible traces. The unit produces these traces on 50 milli-



Heat of steel is tapped from this 40-ton, 14,000-kva tilt-type Loftus-Ing. Leone Tagliaferri electric arc furnace.

LOFTUS-TAGLIAFERRI

arc furnaces with new outstanding precision control

Today's high alloy and specialty steels demand close electric furnace control. Bath temperature must be uniform, and correct arc distances must be maintained. In the Loftus-Tagliaferri furnace, regulation is hydraulic with electronic or magnetic amplifier. Electrodes retract automatically under power failure. Other refinements include rapid, precise response, and the use of static elements for long-life mag-amp controls. These factors combine to give you higher quality iron, steels, and ferro-alloys.

Ing. Leone Tagliaferri has proved its leadership through 40 years' experience in electric furnace design and construction, with many of the largest installations in Europe, Asia, Africa, Australia, and the Americas. These units range in size from 2 to 200 metric tons. Loftus, with its more than two decades of international experience in the engineering and construction of industrial furnaces, now offers Tagliaferri electric furnaces in the United States. More than ever, Loftus Engineering Corporation is your best source of complete furnace knowledge.

From first heat to heat treat, look to

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First choice in heavy-duty tank cleaning—hard-working Oakite "24"

Users everywhere agree that their best way to clean iron and steel parts is to tank-soak them in a hot solution of heavy-duty Oakite 24. This hard-working alkaline cleaner gets under the dirt layers and literally tears the soil from the surface. Despite excessive soil contamination of solution Oakite 24 maintains proper pH level and provides long, effective cleaning action.

Oakite 24 is but one of a wide range of alkaline tank-cleaning compounds. Others include medium and light duty oil and grease removers; self-emulsifying solvent cleaners specially designed for removing buffing compound residues, pigmented drawing compounds and other tenacious burned-on solid-particle dirts and smuts. Also available is a useful selection of materials for cleaning brass, copper, aluminum, magnesium, lead, tin and zinc.

Which is best for you? Only you and the Oakite man together can decide. It depends on your equipment, the parts you process, the next production step. Ask the Oakite man. From over 30 materials, you're *sure* to get the one cleaner that works most efficiently for you. Write for Bulletins. Oakite Products, Inc., 34G Rector Street, New York 6, N. Y.

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OAKITE

over 50 *Est. 1909* SCIENCE

years' leadership in industrial cleaning

meter rectangular coordinate charts moving at a choice of four push-button-selected speeds. The system includes two transistorized current-feedback power amplifiers, their power supply, and the preamplifier power supply. (Sanborn Co.)

For more data circle No. 63 on postcard, p. 165

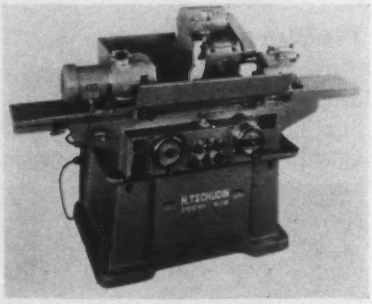
Dresser

A shake-free dresser makes it possible to dress a grinding wheel to exactly the same shape as the profile bar. It can do this without the necessity of honing or modifying the profile bar in any way to compensate for clearances found in sliding members of conventional dressing devices. (Landis Tool Co.)

For more data circle No. 64 on postcard, p. 165

Universal Grinders

Fully hydraulic, a line of universal grinders solves most close tolerance problems without the use of expensive electronic equipment. The grinders come in three sizes: 8 x 12



in., 8 x 16 in., and 8 x 24 in. The grinders feature: infeed repeats within 20 millionths; work spindle runs round within 25 millionths; very high surface finishes; unitized construction. (Alina Corp.)

For more data circle No. 65 on postcard, p. 165

Razor-Blade Knives

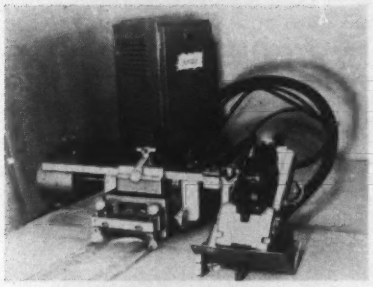
Industrial cutting, slitting, trimming or slicing operations, can now be done at lower cost with new industrial throwaway razor - blade knives. These long handled, razor sharp knives are very inexpensive. The new throwaway knives are also said by safety engineers to be much

safer than old-fashioned cutting tools. The knives are 5-in. long with a 2-in. razor-sharp steel blade. (Edmund Scientific Co.)

For more data circle No. 66 on postcard, p. 165

Automatic Torch

Automatically, a torch groove seams and prepares the edges of heavy plate for welding. It enables the production of "U" groove plate preparation by butting square-edged plates together and producing the desirable "U" groove in two plates



in one operation. Its fast travel speed and low heat input keeps plate distortion to a minimum. The complete unit consists of a tractor-driven automatic head. It features all position adjustment of electrode angle and variable electrode feed. (Arcair Co.)

For more data circle No. 67 on postcard, p. 165

Test Gage

Temperature-compensated, a test gage maintains a high degree of accuracy over temperatures ranging from polar to tropic. These gages, which meet military specifications, will be used in missile and aircraft ground support. In the process and manufacturing industries they will be used on test benches, in test cells or on instrument panels. They will also be used as portable test instruments and in the shop for the calibration of production - type gages. Temperature compensation is built into both bourdon-tube and linkage. (American Machine & Metals, Inc.)

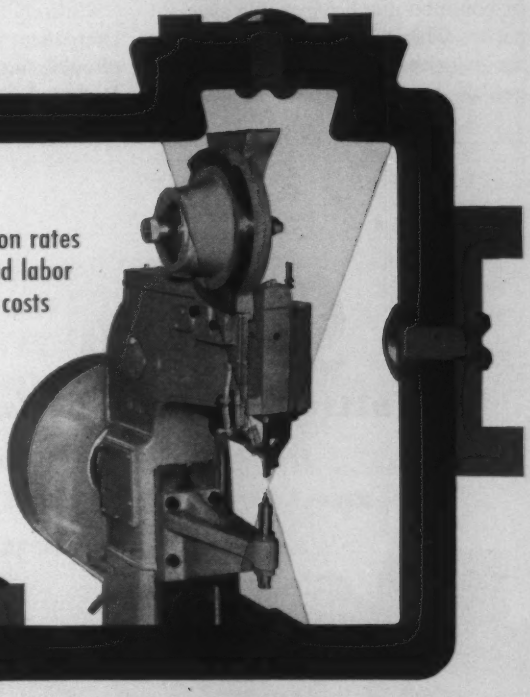
For more data circle No. 68 on postcard, p. 165

Curve Follower

It is only necessary to plot a repetitive function variation once with a new curve follower. Continu-

Odd shapes are no problem for the new Townsend Model 75 Tubular Rivet Setting Machine

High production rates using unskilled labor cut fastening costs



Skillfully designed tooling gives complete versatility to the new Townsend Model 75 Tubular Rivet Setting Machine. A variety of specialized tooling is available to equip the Townsend machines for any size and shape of work.

Townsend tubular rivets are available in steel, aluminum, copper, brass, nickel-silver and special materials for use in joining anything from cloth to steel sheets. Thus, Townsend makes available the economies of tubular rivet fastening for a wide range of products in a number of different materials. Townsend's experienced fastening engineers provide application design service.

To enjoy the economies of fastening with tubular rivets, write for information on Model 75 Setting Machine and complete line of Townsend tubular rivets. Townsend Company, Engineered Fasteners Division, P.O. Box 71-B, Ellwood City, Pa.

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In Canada: Parmenter & Bulloch Manufacturing Company, Limited, Gananoque, Ontario

ous rotation of the data drums in the new models produces cyclical output signal variations from a pencil drawn "pattern." The device interprets function curves drawn as a double line with ordinary pencil on common graph paper. No special paper, pencils, or conductive inks are required. The pencilled chart guides a servo driven capacitive probe that follows the centerline between the plotted lines. Data drum rotation time is adjustable from 300-10 seconds per revolution (12 to 360 cycles per hour) on standard models. (Research, Inc.)

For more data circle No. 69 on postcard, p. 165

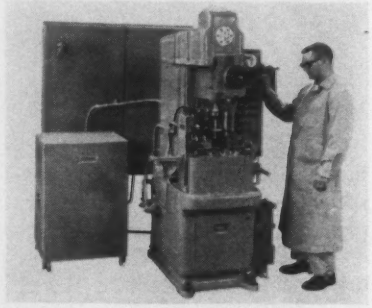
Metal-Saw Sharpener

Entirely automatic, a metal-saw sharpener is capable of grinding circular metal-cutting saw blades. It can also cut new teeth in disks, and adapt to sharpening power hacksaws, bandsaws, and straight-edge knives. Designed for action and durability, this machine cuts saw teeth at a speed of 50-80 per minute. (Wandsbeker Co.)

For more data circle No. 70 on postcard, p. 165

Automatic Microhoning

Completely automated, a mechanical-stroke machine has the speeds and controls required to microhone short bores and small diameters to close tolerances. It can do this at high production. The unit generates final functional accuracy while maintaining the relationship of the bore to other surfaces of the part. The table has a 5-in. drop-away. This makes it possible, in certain applications, to microhone a part that is longer than the stroke of the machine. Quick-change universal tool adaptor holds tool change-over time to a minimum. (Micromatic Hone Corp.)



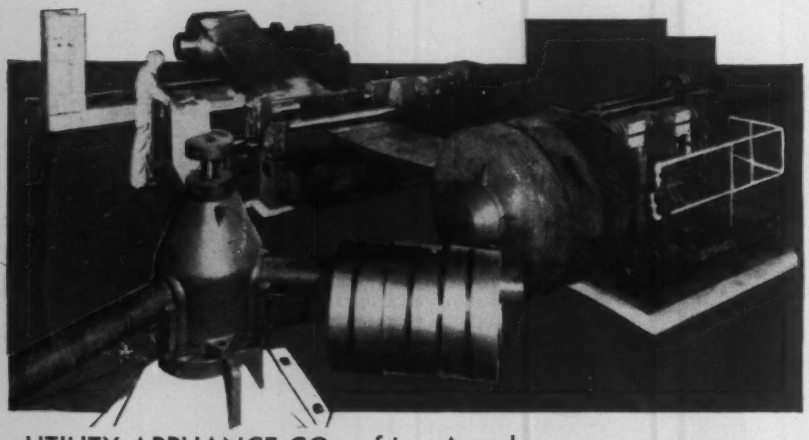
For more data circle No. 71 on postcard, p. 165

Epoxy Adhesive

A two-component, contact-pressure epoxy adhesive can be cured at room temperature to provide high bond strength. The resin is furnished as a solvent-free, non-volatile, medium-thick paste with a two-hour pot life. It meets MIL-A-8623, Type II, the federal specification for the aircraft industry. The new adhesive is formulated for uses where it is impractical to apply heavy pressure or heat for hardening. Tensile strength is cited as 8300 psi, and hardness as 83 Shore D. Properties include: low shrinkage, resistance to mechanical and ther-

Stamco

slitting and coiling line saving time and material in west coast installation



UTILITY APPLIANCE CO., of Los Angeles now has line to handle 20,000 lb. coils up to 48" wide and gauges up to 1/8 inch. Low investment—long life—make this a wise move toward reducing operating costs.

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mal shock, and good resistance to water, chemicals, oils, solvents, and aromatic fuels. (Marblette Corp.)

For more data circle No. 72 on postcard, p. 165

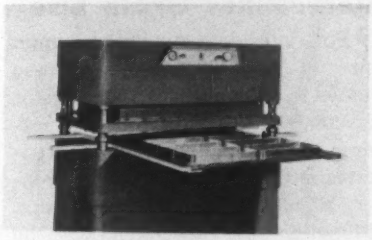
Door Heaters

Heaters stop cold drafts through plant shipping doors when they are open. They also supplement the plant heating system when doors are closed. These heaters automatically provide a high-velocity curtain of warm air when a door opens. When the door closes a damper is automatically repositioned for discharge of warm air at normal velocity. This provides either room or perimeter heating under room thermostat control. In summer, the fan may be operated without heat to promote air circulation. (L. J. Wing Mfg. Co.)

For more data circle No. 73 on postcard, p. 165

Die Cutting Press

A die cutting press trims finished packages formed by skin and blister plastic packaging. This press used low cost rule dies that permit



rounded corners and pierced holes. It features a large platen area, short, fast stroke; adjustable shut height, simple installation and low initial cost. (Comet Industries)

For more data circle No. 74 on postcard, p. 165

Welding Package

Rated 200 amp at 25 v, a constant voltage motor - generator welder is designed especially for automatic welding. "Micro-Wire" welding is a semi-automatic or fully automatic low amperage electric-arc process. It continuously feeds a small diameter bare wire electrode into a welding zone shielded by a gas, usually carbon dioxide (CO_2) or a mixture of argon and CO_2. This open arc process, permitting "Micro-Wirewelding," produces a high-quality weld on various metals; particularly those in the sheet metal classification and where poor joint fit-ups are encountered. (Hobart Bros. Co.)

For more data circle No. 75 on postcard, p. 165

Grinding Machine

Fully guarded for operator's protection, a belt surfacer provides wet operation, compact design and a large 4- x 9-in. grinding surface. Belt changing is a simple matter. Belt tension is constant. In addition to its use as a coarse grinder for metallographic samples, the machine is also ideal for other grinding purposes, wet or dry. (Buehler, Ltd.)

For more data circle No. 76 on postcard, p. 165

Check-Out System

An all-parameter automatic testing system checks any characteris-

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PHOSPHATE COATING
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HERE'S HOW **PAINTITE** SCORES ON SURVEY'S 12 "MOST WANTED" FEATURES...

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During the first six months of 1959, Turco undertook an extensive survey of the phosphate coating market. Hundreds of users of these coatings were interviewed. Thousands of questions were asked. When the answers were tabulated, Turco began the task of building an iron phosphate process to the *exact specifications* called out in the survey.

The new process is now available. It is called Turco Paintite. Paintite has been thoroughly field-tested in the production lines of a dozen Turco customers. It has passed the most severe tests with flying colors. Turco is proud to announce the addition of Paintite to its ten other Turcoat phosphate and conversion coating processes that provide a better bond for organic finishing.

1. **SUPERIOR CLEANING**–Exclusive wetting system provides heavy-duty uniform cleaning. Cleans & phosphates simultaneously.
2. **TEMPERATURE VERSATILITY**–Efficient anywhere within range of 140° to 180°F. Temperature control is not important.
3. **LOW FOAMING**–at any temperature within recommended range.
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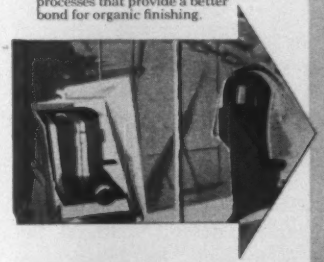
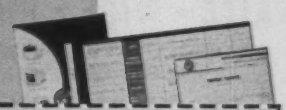
5. **NO WHITE STREAKING**–Extra free rinsing. Leaves no residue.
6. **ECONOMICAL**–Low in initial cost. Low in maintenance cost. Low in cost per sq. ft. Long-lived, even under mass production use.
7. **UNIFORM COATING**–even on edges and points. Won't show through on low-pigmented paints.
8. **USE VERSATILITY**–used by immersion, spray washer or steam cleaner.
9. **LESS SLUDGE**–less scale. Minimizes clean-up problems.
10. **RESERVE ACIDITY**–combats alkaline water conditions. Constant control not necessary.
11. **SUPERIOR SERVICE**–by Turco's vast network of technically trained servicemen, located in industrial centers throughout the world.
12. **REQUIRES ONLY 3 STAGES**–for dip or spray washing. Can be efficiently used in 5-stage operations, if desired.





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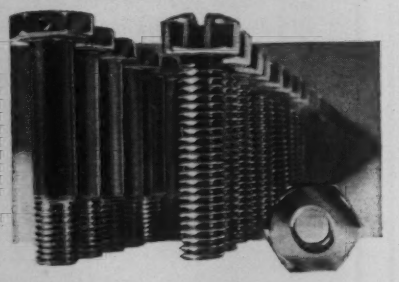

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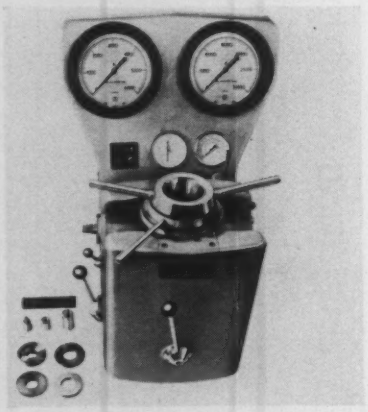
tic convertible to an electrical equivalent. Checking ordinary voltage and current, it also tests modulated and unmodulated frequencies up to the 3000 megacycle range. In addition it tests pulses with very low rise time and duration. Using replaceable intelligence units, the system is not obsoleted whenever it becomes necessary to check new characteristics. It is possible to check up to 9999 different points with an accuracy of ±0.5 pct or better, in a single system. (Audiotronics Co.)

For more data circle No. 77 on postcard, p. 165

Sheet-Metal Tester

A versatile sheet-metal testing machine simulates actual deep drawing press operations. The ductility or forming quality of sheet metal can be predicted with a high degree of accuracy with the tester. As a result, scrap losses and rework costs are reduced to a minimum.



The life of costly dies is prolonged by rejecting defective material before it is formed. By substituting the interchangeable plunger and dies, the unit can also be used for deep draw cupping tests, hole expansion tests and optimum clamping pressure determinations. (Tinius Olsen Testing Machine Co.)

For more data circle No. 78 on postcard, p. 165

Portable Gantry

For loads up to 30 tons, a portable self-raising gantry is made up of two A-frame legs, a crossbeam, fixed wheels or casters and the hoisting mechanism. Clear spans range from 9-16 ft. Headroom is from 10-20 ft. The gantry is suitable for hand block and tackle or electric hoisting gear. The A-frame legs are adjustable to give the gantry greater flexibility, depending upon the height available. The wheels are grooved for use on rails. (Ontario Equipment, Inc.)

For more data circle No. 79 on postcard, p. 165

Drill Press

With variable-speed drive, a 20-in. drill press performs both high- and low-speed drilling operations on one drill press. The press incorporates a two-speed motor with the variable-speed drive. The spindle speed range is from 120-1750 rpm. This unit makes it possible to perform any drill requirement from reaming, spot-facing and tapping to polishing and high-speed drilling on a single drill press. (Powermatic Machine Co.)

For more data circle No. 80 on postcard, p. 165

Determines Grain Size

For rapid determination of grain size in copper and copper-base alloys, a micrographex comparator is compact and portable. An external reflecting element, incorporated into the housing, insures proper alignment of the microscope. Mounting the specimen on the microscope stage and rotating the standard micrographs determine grain size. (General Scientific Equipment Co.)

For more data circle No. 81 on postcard, p. 165

Tests Thickness

With microscopic accuracy, an instrument gages the thicknesses of coatings on iron and steel. The device provides a non-destructive means of measuring thicknesses of organic and non-magnetic metal coatings. To measure the thickness of a coating, a probe is simply applied to the surface. A closed magnetic field is created between the poles of the probe with the lines of force largely contained within the base metal. The thick-

Another MX Test System at work...

Testing wall thickness for casting core shift. Arthur Lindgren, Magnaflux Field Engineer, works with Floyd Mortimore, chief inspector and Edward Moody, inspector. Harrison Steel Castings Company, Attica, Indiana.

How Thick?

New Transistorized Dial-Reading, Portable Ultrasonic Test Unit Tells You Instantly

Testing from one side only, it tells thickness as fast as a probe can be moved over a surface: steel, cast iron, aluminum, brass, magnesium—plastic, almost any solid, from .025" to 3.00" thick.

Time-saving uses include testing for thin wall due to core shift in casting production (see above), spotting corrosion or wear in pipes, tanks, valves, aircraft skins and wings, and in-production thickness tests of spinnings, stampings, etc.

All-new, the transistorized SONIZON SO-300 is a completely portable, battery-powered ultrasonic test unit, providing direct dial reading of thickness. Accuracy is ±1% when calibrated against known samples.

Complete with high impact-proof carrying case and battery case. Measuring unit weighs only 12¼ lbs.

For more information or demonstration, phone our local Field Engineer or write to Magnaflux Corporation, 7302 W. Lawrence Avenue, Chicago 31, Illinois.

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PHOTOGRAPH BY BEN SPIEGEL

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Tom is an Alcoa Technical Service Representative with 23 years' training on single- and multiple-spindle machines. He reads chips like you read books. He can look at a freshly cut sliver of metal and tell you whether the speed, feed, tool and alloy are right for the job. If one of these is wrong, you're losing money. Tom can show you how to save it.

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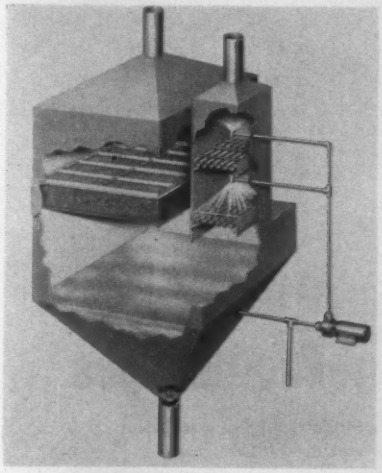
NEW EQUIPMENT

ness is accurately indicated on one of the direct-reading scales of the instrument. (Twin City Testing Corp.)

For more data circle No. 82 on postcard, p. 165

Air Scrubber

Newly designed, an air scrubbing system promises an economical solution to the dust collecting problems of industrial plants. The unit uses a water spray over stainless steel screening to entrap impurities. Discharged air may be recirculated in the plant or released to the atmosphere without risk to contamination. With no moving parts, the



scrubber is easily maintained. Self-cleaning design permits constant operation. (Antipol Corp.)

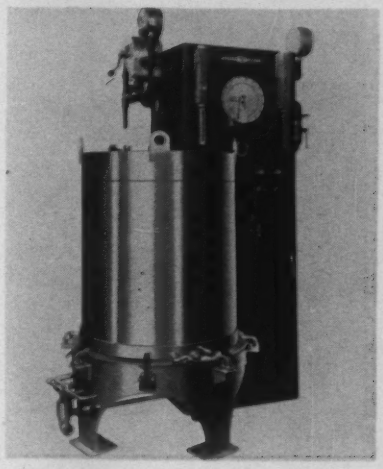
For more data circle No. 83 on postcard, p. 165

Rod Descaler

Arranged with double planetary gear, a mechanical rod descaler is specifically designed for the processing of stainless steel, alloy, and high carbon rods. Mechanical rod descaling can now be extended with perfect results to the stainless steel, high carbon and alloy steel industries. The scale is broken and brushed clean by the unit's double planetary gear brush system. The machine is also designed so that it can be used to get the first draw with water cooled drawing die holder built into the forced lubrication box. The machine completely does away with the sometimes difficult problem of acid waste disposal. (Straus-Artys Corp.)

For more data circle No. 84 on postcard, p. 165

Bright Tempering



Designed for bright tempering of stainless steels, an atmosphere furnace has a full length bell-type insulating outer shell. This provides efficient heat retention. Within the outer shell is a sealed retort which

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encloses work load, heating elements, baffles and forced convection fan. The furnace produces quality work at high production rates. Standard models of the furnace accommodate work baskets 13-in. diam x 17-in. deep, or 17-in. diam x 24-in. deep. (C. I. Hayes, Inc.)

For more data circle No. 85 on postcard, p. 165

Handles Coil Stock

Tong-action coil lifters, with motorized swivels, handle coils with cores in the horizontal position. One lifter handles a complete range of coil widths. Only one man, the crane operator, is required to operate the lifter. Tong-action lifters are designed with lifting legs that are in a vertical position at any opening. This permits the crane operator to pick up or set down a coil using a minimum of space. Space can be as little as 10 to 12 in. between stacks of coils, regardless of coil width. (Cullen-Friestedt Co.)

For more data circle No. 86 on postcard, p. 165

Air Drying Unit

For the protection of pneumatic controls, an air unit has a rated capacity of 10 standard cu ft per minute at 100 psig. It is ideally suited for air conditioning and ventilation control systems, and pneumatic feeds; also process and production lines. The units dry air and gases by mechanical refrigeration. No cooling water is needed. The dryer is enclosed in a steel cabinet for floor or wall mounting. The unit

measures 20⅛ in. high x 14 in. wide x 12 in. deep. It weighs about 60 lb. (Hankison Corp.)

For more data circle No. 87 on postcard, p. 165

Work Gloves

Plastic-impregnated work gloves retain their high finger dexterity. They are made from a napped cloth impregnated on one side with polyvinyl chloride. This plastic impregnation gives the gloves their high

wear and snag resistance. It also provides them with a firm gripping surface. Although not moisture- or oil-repellant, the gloves show less absorption than untreated cloth gloves. They may be washed repeatedly. (Jomac Inc.)

For more data circle No. 88 on postcard, p. 165

Insures Little Moisture

For low hydrogen type electrodes, a new packaging idea minimizes the absorption of moisture. The packaging permits freshness and dryness of the electrodes to be used in applications where close control of moisture content is necessary. Moisture resistance is possible in the cartons by an inner layer of aluminum foil in the corrugated cardboard. (Air Reduction Co., Inc.)

For more data circle No. 89 on postcard, p. 165

Forming Machine

For the high-speed production of stamped and formed parts, from ribbon metal or wire stock, a forming machine can operate from any angle. Its flexibility and versatility afford considerable time saving in set up and maintenance. It will form and eject parts without restriction due to its operating angle.

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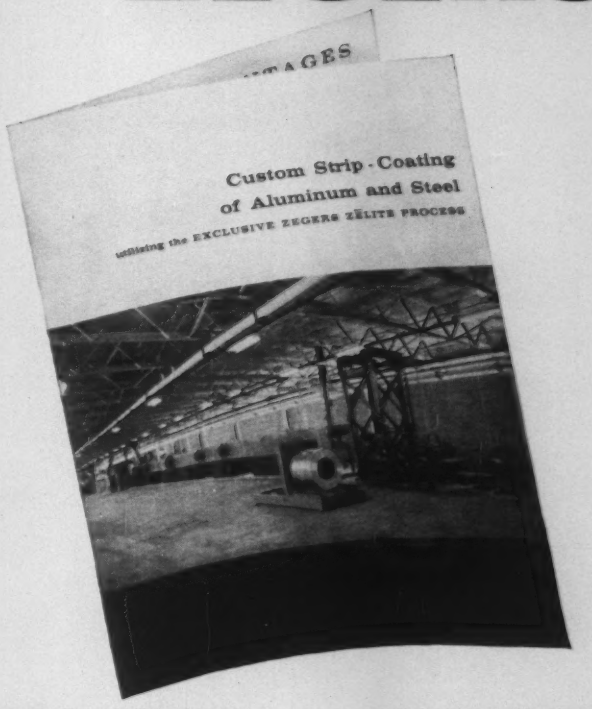

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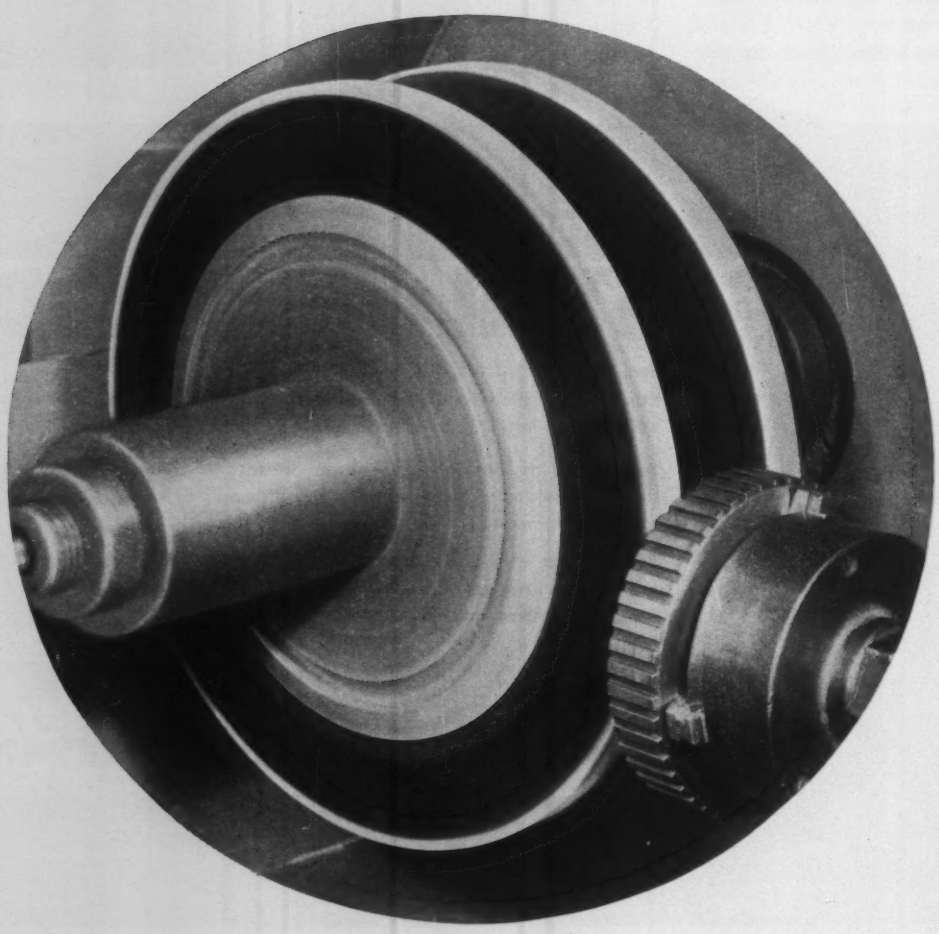

The Iron Age Summary

Inventory "Loss" Hurts Market

Subnormal inventories and tight buying have been aggravated by consumer cuts in transit time.

It's estimated that from 5 to 7 million more tons of steel would have been shipped this year if steel stocks had stayed at normal levels.

■ Inventory control and the tightest buying practices ever experienced by the steel industry have taken from 5 million to 7 million tons of steel from 1960 shipments.

It's conceded that the figures represent only a statistical loss. However, the results of close-to-the-vest steel ordering have importance on the outlook for the steel market.

Reasons Why—First, they are affecting current steel operations, which are around 51 pct and may go even lower as seasonal factors take effect in November and December.

Second, these practices are forcing the mills to carry more and more inventory for the steel users, who now demand delivery in a matter of days, instead of weeks. This adds to the cost of making steel.

Future Planning—But, the subnormal level of inventories today must be considered in future planning. Inventories are so low, and transit times so short, that any upward move in steel orders would be compounded. A good share of the 5 to 7 million tons "statistical" loss would immediately be translated into order backlogs.

Low inventories are a matter of record, but the cutting of transit time to the minimum is having an added effect. One major automotive plant is an example. In addition to reducing inventories of steel in stock, it cut 4 days transit time that had been part of its inventory figuring.

Trend Spreads—This tendency is spreading throughout industry. Steel mills suspect that transit time on component parts has also been compressed. Normally, about one-third of steel stocks are in the form of inventory in process. Reduced transit times could add up to 2 million tons more taken out of inventory.

This is in addition to the 3 to 5 million tons that have been cut from what had been considered workable inventories of steel in the hands of consumers.

Market Looks Weak — In the overall steel market, the order pattern has slipped again in the past week. This is principally because of automotive setbacks aggravated by seasonal factors. Automotive setbacks have been prompted by two factors: Scheduling of lower output through November and December; some apparent over-buying in October.

From now on, the automotive steel market will vary in relation to the automotive customer. Not all cars are moving in the same pattern and this will help some steel companies, but hurt others.

Automotive steel orders as a whole for November look as if they'll fall below October. December looks like it will drop below November. January ordering isn't heavy enough as yet to tell. But for some companies, it looks light.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	1,464	1,468	1,579	2,233
Ingot Index				
(1947-1949=100)	91.1	91.4	98.3	139.0
Operating Rates				
North East Coast	57.0	54.0*	59.0	89.0
Buffalo	54.0	54.0*	60.0	89.0
Pittsburgh	48.0	48.0*	49.0	81.0
Youngstown	36.0	38.0*	44.0	78.0
Cleveland	54.0	57.0	57.0	76.0
Detroit	70.0	68.0*	71.0	81.0
Chicago	52.0	51.0	61.0	72.0
Cincinnati	54.0	57.0*	62.0	82.0
St. Louis	68.0	75.0*	73.0	105.0
South	52.0	53.0	51.0	64.0
West	48.0	50.0*	54.0	80.0
U. S. Rate	51.4	51.5	55.4	78.9

*Revised

Source: American Iron and Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.32	$66.32	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$28.33	$28.33	$29.50	$46.17
No. 2 bundles	$18.50	$18.50	$20.17	$31.83
Nonferrous				
Aluminum ingot	26.00	26.00	26.00	26.80
Copper, electrolytic	30.00	30.00	33.00	30-33
Lead, St. Louis	11.80	11.80	11.80	12.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	103.625	104.00	103.125	101.00
Zinc, E. St. Louis	13.00	13.00	13.00	12.50

Teamwork Pays in Purchasing

Lawrence Jarvey, purchasing agent, Oshkosh Motor Co., says close cooperation with management makes a better purchasing department.

In his company, meetings with top management mean lower inventories and better production results.

■ At every purchasing agents' meeting, the P. A. is urged to cultivate direct contact with production men, his own salesmen, and his own top management. His job, the management consultants say, is to bring purchasing more closely into the management team.

Lawrence Jarvey, Oshkosh Motor Truck, Inc., heads up a purchasing team that is as much a part of plant operations as the tool room. Here's how it works.

Production meetings are a three-time-per-week affair at Oshkosh Motor. Presiding is the works manager (vice president of Operations). A purchase department representative sits in with production reps, the shop expediter, the assembly foreman, and the stockroom foreman.

Short Conference—The group will confer not much over half an hour, at the start of the working day. With production men made more keenly aware of inventory levels and costs, and with purchasing men given a first-hand chance to balance the cost of overstocks against possible production delays due to shortages, the two departments have come to function as a close-knit team.

Does a purchasing agent lose control by working that closely with production? In the Oshkosh Motor operation it doesn't seem to work that way. Production inaugurates a requisition. It's the purchaser's job to fit this into existing inventories and apply economic order quantity thinking.

The joint meetings have proven so successful that Mr. Jarvey's department, and the production men, now use a joint production record card. The card gives production a play-by-play account of existing inventory levels, as well as expected delivery dates of material on order. Purchasing, using the same card, is constantly aware of production schedules as well as the regular inventory control measures needed.

Full Staff—The Oshkosh Motor system goes a step higher. At the inception of a new production program, top management hammers out plans in staff committee. The president, vice president, director of engineering, production manager, sales manager, and his assistant, and the purchasing agent, check out the plan. It's the purchasing man's job to keep the committee aware of required lead times on raw materials and feed in data which the purchasing department is especially equipped to supply—price and services offered by various vendors.

The basic Oshkosh Motor inventory system is the ABC setup. But it's worth noting that, with this much time devoted to work outside its own department, Mr. Jarvey's purchasing group is able to apply EOQ buying to both A and B inventory items.

The system pays off. Inventories of many major items can be cut to as low as two weeks to 30 days.

It's significant that the Oshkosh Motor purchasing department was studied by a top Midwestern University business school which reported that the Oshkosh committee system rates with some of the top U. S. purchasing departments among large corporations.

LAWRENCE JARVEY: Cooperation means better buying.

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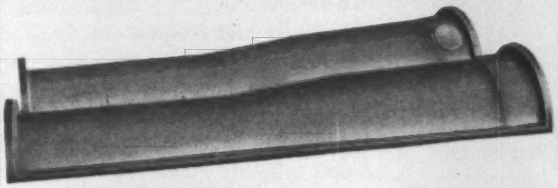

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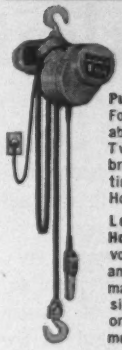

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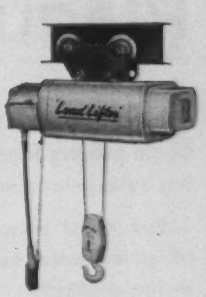
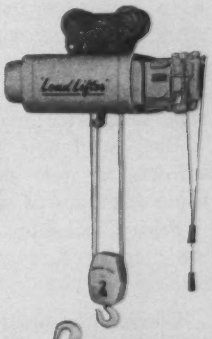


AIR HOISTS

Budgit Air Hoist. Link and roller chain types. Pendant cord control. Speeds infinitely variable to 75 FPM. Rigid mount push trolley available. Safety hooks standard. ¼, ½ and 1 ton. Also Load Lifter Air Hoists with wire rope load line to 15 tons.



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Budgit Chain Blocks. ¼ to 10 tons. Light, tough aluminum frame. 25 lb. pull on hand chain lifts 500 lbs. Fast action load brake makes lowering easy. Hook suspension or Army type trolley.

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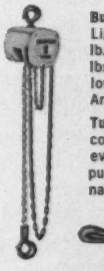

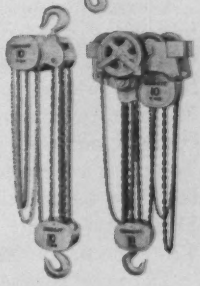

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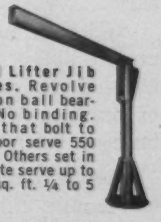

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Price Softness Still Plagues Market

Next month many mills will begin paying higher wages, raising talk prices may go up.

But right now several areas of price weakness are present in the market.

■ In less than two weeks, most steel producers will start paying wage increases to workers. This has stirred speculation about possible steel price increases.

But, as of now, there's growing softness in steel prices. Here are some examples of what's going on:

Price concessions by distributors are mentioned, especially on reinforcing bar.

Foreign Competition — On the mill level, producers recently cut base prices on reinforcing rod and bars. These mills, located in the Midwest, were under heavy price competition from imported steel. Tonnages of reinforcing bars and rods are being shipped in via the Mississippi River, selling at prices $20 a ton under domestic prices.

The price structure on distributor sales of stainless is soft. Some distributors are reported as sharing mill discounts with buyers to land sales.

And even on the mill level, several stainless producers recently lowered the price on two grades of rerolling billets. The battle for business brought the reduction.

Steel Output—During the first ten months this year mills turned out 87.2 million tons of ingots and steel for castings, according to the American Iron and Steel Institute. This compares with 74.1 million tons made in the same period last year, when the strike cut output.

Through the first ten months of 1960, the industry operated at an average of 70.3 pct of its capacity. However, it turned out almost as much steel as was made at over 100 pct of existing capacity in 1951. Output in the first ten months of 1951 was 87.5 million tons.

During October, 1960 steel production totaled 6.8 million net tons of ingots and castings.

Sheet and Strip—November orders for many sheet mills will be even with or below those of October. Some orders have been shuffled around, but others have been cut back. **East Coast** producers say buyers are still living off the mills. One mill there will shut down its hot-rolled mill for a week, mainly due to poor business. An auto stamper in the **Pittsburgh** area plans sharp cuts in December sheet tonnage. Mills there say November is shaping up about on a par with October.

Flat-rolled mills in the **Cleveland** market are operating between 50-55 pct of capacity, with no major changes expected. A few more advance orders are coming in from smaller-sized companies. **Chicago** mills continue offering two week delivery on sheet products. Low inventories by some appliance makers have brought in a few orders to mills. But planned production schedules for the appliance makers don't indicate any large-scale buying.

Plates and Shapes—In the **East,** a few more construction and shipyard jobs have lifted the market slightly. But the gains are not large. Although structurals are the products mainly involved, deliveries have not stretched out. In the **Midwest,** the plate market is still slow. All grades are on one-week delivery with few orders from linepipe makers, tank, and rail car builders. Structural sales are starting to slide off seasonally.

Bar—November bar shipments for one **Pittsburgh** mill will be about the same as October. As mentioned, **Midwest** producers are running into stiff competition from imported reinforcing rod and bars. **Detroit** area producers say December orders don't look as good as November's at present order rates. In **Chicago,** both hot-rolled and cold-finished bar orders are falling off, after a slight pickup last month. Right now there's plenty of idle capacity of hot-rolled bar mills. Some producers are encouraged by gains in orders from the screw machine industry.

Service Centers — Large warehouse chains say November orders are falling below October levels. They expect another slip in volume in December. Because there had been hope November sales would show up better, some outlets are thinking about more inventory cuts. Among the grades mentioned are bar, wire, plate, and some strip. As of now, bar seems to be the best moving product at the distributor level.

Pipe and Tubing — Pittsburgh mills say standard pipe and oil country seamless are still in the doldrums. Some linepipe projects are in the works. But it's difficult knowing when they will become active.

PURCHASING AGENT'S CHECKLIST

What the election will mean to business—A special IRON AGE staff report. P. 105

A steel sales pickup starting next March is predicted by Tom Campbell, IRON AGE Editor-in-Chief. P. 109

Enamel and ceramic coatings are widening their uses. Here's a rundown on the types available. P. 148

COMPARISON OF PRICES

(Effective Nov. 15, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Nov. 15 1960	Nov. 8 1960	Oct. 18 1960	Nov. 17 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plate (1.50 lb.) cokes	$10.65	$10.65	10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire Rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Nov. 15 1960	Nov. 8 1960	Oct. 18 1960	Nov. 17 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.11	$70.11	$70.57	$70.57
Foundry, South Cin'ti	71.92	71.92	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	69.61	69.61	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb.‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.32	$66.32	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$26.50	$26.50	$28.50	$47.50
No. 1 steel, Phila. area	33.00	33.00	33.50	46.50
No. 1 steel, Chicago	25.50	25.50	26.50	44.50
No. 1 bundles, Detroit	21.50	21.50	25.50	44.50
Low phos., Youngstown	28.50	28.50	29.50	51.50
No. 1 mach'y cast, Pittsburgh	45.50	45.50	45.50	55.50
No. 1 mach'y cast, Phila.	47.50*	48.50	49.50	54.50
No. 1 mach'y cast, Chicago	41.50	41.50	41.50	64.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$28.33	$28.33	$29.50	$46.17
No. 2 bundles	18.50	18.50	20.17	31.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	33.00	30-33
Copper, Lake, Conn.	30.00	30.00	33.00	33.00
Tin, Straits, N. Y.	103.625†	104.00	103.125	101.00
Zinc, East St. Louis	13.00	13.00	13.00	12.50
Lead, St. Louis	11.80	11.80	11.80	12.80
Aluminum, ingot	26.00	26.00	26.00	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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* Appears in the Nov. 10-Nov. 24 issues.

Market Analysis: Status Quo

The scrap market continues dull this week with very few overall changes.

New York and Pittsburgh strengthened slightly, but St. Louis and Cleveland eased.

■ The scrap market continues dull with little variation in its overall outlook.

While the market is somewhat stronger in Pittsburgh and New York this week, it eased in Cleveland and St. Louis. Most other areas remained at last week's low level, but are braced for further drops.

In Pittsburgh, dealers feel the relatively "high" price of No. 1 railroad heavy melting on the most recent railroad list reflects spot demand rather than real strength. The New York market is a little stronger because of a consistency in export demand. But even here dealers say the market has not really firmed.

Philadelphia, where exports have sustained the market in recent months, is expecting a drop in export prices next month. Generally, markets are dormant and many dealers have adopted the philosophy that the only thing to do is sit it out.

Markets throughout the Midwest are standing stationary this week. Several small mills in Chicago made limited purchases and the market there appears to have hit at least a temporary bottom. The Detroit market is also dormant.

The IRON AGE composite price for No. 1 heavy melting this week remains at $28.33 and the composite price for No. 2 bundles is also the same as last week at $18.50.

Pittsburgh—Prices on a late railroad list were generally down from last month, but not as much as might have been indicated by earlier offerings. No. 1 railroad heavy melting went to domestic bidders for a little under $35. This was down from the comparable figure of last month but was about $7 over the low price on early lists. While conceding this is a surprising spread, some brokers feel the relatively high price reflects spot demand rather than real strength. Trading of dealer grades is too limited to show any significant price trends.

Chicago—The market continues to hold with additional purchases by small mills. Reported sales move at spreads of as much as $4 per ton. The market appears to have hit at least a temporary bottom this week. Out-of-area sales continue to drain scrap from Chicago, both for export markets and markets in other areas. At current prices, dealers are even said to be laying down turnings.

Philadelphia—The market continues weak with exports remaining on the easy side. General speculation is that further price drops can be expected with exports off in December. For the time being, export activity still sustains the market. Two ships are loading now and another is expected to start soon.

New York—The market is a little stronger this week, but area dealers insist it has not firmed. Export demand has shown some consistency in recent weeks and this has prompted the optimism. However, volume isn't high and prices aren't firm.

Detroit—The market is dormant. The most significant development this week was a major consumer's hold notice for No. 2 bundles. However, the order was a small one. Lack of export activity and Canadian interest are other weakening factors.

Cleveland — The market has taken a weaker tone in the absence of large dealer orders. Dealers are selling small tonnages to meet expenses and sitting it out. Most top grades have been bled off as the only saleable items.

Cincinnati—Small tonnages are moving to a single area buyer and a few smaller loads are going upriver. The outlook is uncertain with more dealers resigning themselves to sitting it out.

St. Louis—The expected decline in scrap prices has materialized with losses of $1 to $2 registered. There is very little activity, however one mill is making some purchases at a lower level. The outlook for the rest of the year is gloomy. Any hopes of an upturn have completely disappeared.

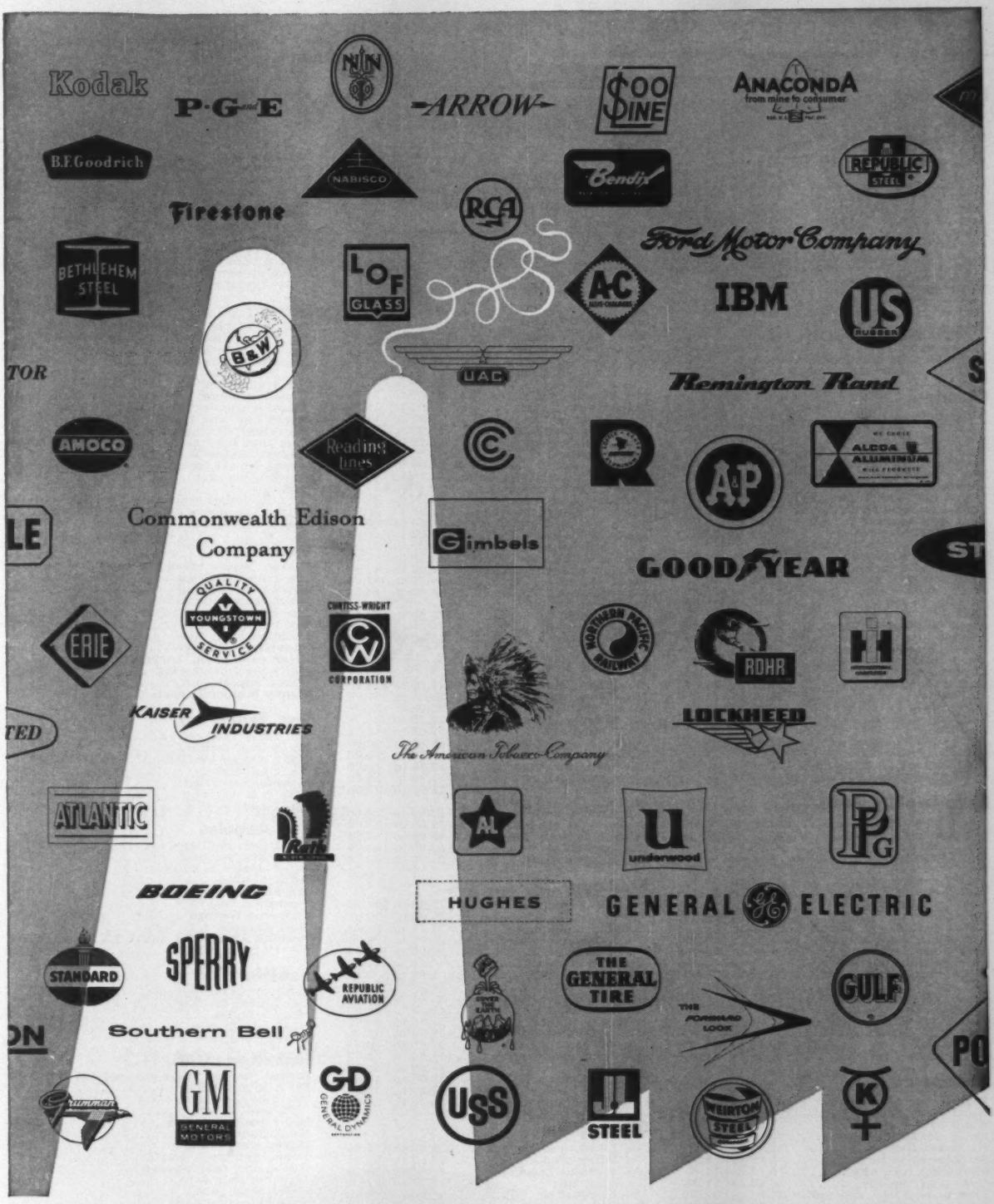
Birmingham—Brokers were still trying to fill orders taken last week, but report that resistance to recent price cuts is "terrific." There is practically no new buying, even from foundries.

Buffalo — The market remains weak with absolutely no new activity, and, no price changes.

Boston—The situation is still the same in Boston. There is no activity, no promise of activity, and no price changes.

West Coast—Scrap intake is very slow, and there are no indications of any improvement in the market. Exporters are completing 1960 orders, and the trade awaits new Japanese export orders to add some life to the industry.

Houston—The market is quiet. The district mill suggests that brokers ration their shipments of scrap under existing orders through the remainder of the year despite expiration dates.



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SCRAP PRICES *(Effective Nov. 15, 1960)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	27.00 to 28.00
No. 1 factory bundles	31.00 to 32.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	26.00 to 27.00
Machine shop turn.	11.00 to 12.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	15.00 to 16.00
Low phos. punch'gs plate	32.00 to 33.00
Heavy turnings	23.00 to 24.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rails, random lgth.	40.00 to 41.00
Rails 2 ft. and under	45.00 to 46.00
RR specialties	36.00 to 37.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	85.00 to 90.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	25.00 to 26.00
No. 1 factory bundles	29.00 to 30.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	25.00 to 26.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn	12.00 to 13.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Low phos. forge crops	37.00 to 38.00
Low phos. punch'gs plate, ¼ in. and heavier	33.00 to 34.00
Low phos. 2 ft. and under	31.00 to 32.00
No. 1 RR hvy. melting	29.00 to 30.00
Scrap, rails, random lgth.	37.00 to 38.00
Rerolling rails	48.00 to 49.00
Rails 2 ft. and under	41.00 to 42.00
Angles and splice bars	38.00 to 39.00
RR steel car axles	46.00 to 47.00
RR couplers and knuckles	35.00 to 36.00
No. 1 machinery cast.	41.00 to 42.00
Cupola cast.	36.00 to 37.00
Cast iron wheel	27.00 to 28.00
Malleable	40.00 to 41.00
Stove plate	30.00 to 31.00
Steel car wheels	35.00 to 36.00
Stainless	
18-8 bundles and solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 bundles and solids	75.00 to 80.00
430 turnings	40.00 to 45.00

Philadelphia Area

No. 1 hvy. melting	$32.00 to $34.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	33.00 to 35.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	33.00 to 34.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	18.00 to 19.00
Clean cast, chem. borings	23.00 to 24.00
Low phos. 5 ft and under	35.00 to 36.00
Low phos. 2 ft punch'gs	37.00 to 38.00
Elec. furnace bundles	34.00 to 35.00
Heavy turnings	25.00 to 26.00
RR specialties	36.00 to 37.00
Rails, 18 in. and under	47.00 to 49.00
Cupola cast	37.00 to 38.00
Heavy breakable cast.	36.00 to 37.00
Cast iron car wheels	38.00 to 39.00
Malleable	45.00 to 46.00
No. 1 machinery cast.	47.00 to 48.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.50 to $23.50
No. 2 hvy. melting	19.50 to 20.50
No. 1 dealer bundles	23.50 to 24.50
No. 2 bundles	15.00 to 16.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	10.00 to 11.00
Cast iron borings	10.00 to 11.00
Low phos. 18 in. and under	31.00 to 32.00
Rails, random length	36.00 to 37.00
Rails, 18 in. and under	42.00 to 43.00
No. 1 cupola cast	35.00 to 36.00
Hvy. breakable cast.	28.00 to 29.00
Drop broken cast.	43.00 to 44.00

Youngstown

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	21.50 to 22.50
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Low phos. plate	28.00 to 29.00

Cleveland

No. 1 hvy. melting	$23.50 to $24.50
No. 2 hvy. melting	17.50 to 18.50
No. 1 dealer bundles	23.50 to 24.50
No. 1 factory bundles	27.00 to 28.00
No. 2 bundles	16.50 to 17.50
No. 1 busheling	23.50 to 24.50
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Cut structural & plates, 2 ft. & under	29.00 to 30.00
Low phos. punch'gs plate	24.50 to 25.50
Drop forge flashings	23.50 to 24.50
Foundry steel, 2 ft. & under	25.00 to 26.00
No. 1 RR hvy. melting	27.00 to 28.00
Rails 2 ft. and under	44.00 to 45.00
Rails 18 in. and under	45.00 to 46.00
Steel axle turnings	20.00 to 21.00
Railroad cast.	41.00 to 42.00
No. 1 machinery cast.	41.00 to 42.00
Stove plate	36.00 to 37.00
Malleable	43.00 to 44.00
Stainless	
18-8 bundles	175.00 to 180.00
18-8 turnings	70.00 to 75.00
430 bundles	75.00 to 80.00

Buffalo

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 busheling	23.00 to 24.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	17.00 to 18.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	10.00 to 11.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	11.00 to 12.00
Low phos. plate	31.00 to 32.00
Structurals and plate, 2 ft. and under	33.00 to 34.00
Scrap rails, random lgth.	32.00 to 33.00
Rails 2 ft. and under	42.00 to 43.00
No. 1 machinery cast.	42.00 to 43.00
No. 1 cupola cast.	37.00 to 38.00

St. Louis

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	25.00 to 26.00
Foundry steel, 2 ft.	27.00 to 28.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	18.00 to 19.00
Machine shop turn.	6.00 to 7.00
Shoveling turnings	8.00 to 9.00
Cast iron borings	16.00 to 17.00
No. 1 RR hvy. melting	28.00 to 29.00
Rails, random lengths	35.00 to 36.00
Rails, 18 in. and under	37.00 to 38.00
RR specialties	34.00 to 35.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	34.00 to 35.00
Cast iron car wheels	33.00 to 34.00
Rerolling rails	44.00 to 45.00
Unstripped motor blocks	33.00 to 34.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	28.00 to 29.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	29.00 to 30.00
Elec. furnace, 3 ft. & under	32.00 to 33.00
Bar crops and plate	37.00 to 38.00
Structural and plate, 2 ft.	36.00 to 37.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rail, random lgth.	36.00 to 37.00
Rails, 18 in. and under	43.00 to 44.00
Angles and splice bars	37.00 to 38.00
No. 1 cupola cast.	45.00 to 46.00
Stove plate	45.00 to 46.00
Cast iron car wheels	34.00 to 35.00
Unstripped motor blocks	32.00 to 33.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	19.00 to 20.00
No. 2 dealer bundles	14.00 to 15.00
Machine shop turnings	5.00 to 6.00
Mixed bor. and turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Clean cast. chem. borings	17.00 to 18.00
No. 1 machinery cast.	36.00 to 37.00
Mixed yard cast.	32.00 to 33.00
Heavy breakabe cast.	30.00 to 31.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$18.00 to $19.00
No. 2 hvy. melting	15.00 to 16.00
No. 1 dealer bundles	21.00 to 22.00
No. 2 bundles	14.00 to 15.00
No. 1 busheling	18.00 to 19.00
Drop forge flashings	18.00 to 19.00
Machine shop turn.	6.00 to 7.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	9.00 to 10.00
Heavy breakable cast.	23.00 to 24.00
Mixed cupola cast.	29.00 to 30.00
Automotive cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	145.00 to 150.00
18-8 turnings	45.00 to 50.00
430 bundles and solids	50.00 to 55.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	18.00 to 19.00
No. 1 dealer bundles	22.00 to 23.00
No. 2 bundles	12.00 to 13.00
No. 1 busheling	22.00 to 23.00
Machine shop turn.	3.50 to 4.50
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	11.00 to 12.00
No. 1 machinery cast.	37.00 to 38.00
Mixed cupola cast.	30.00 to 31.00
Heavy breakable cast.	25.50 to 26.50

San Francisco

No. 1 hvy melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	$27.00 to 28.00
No. 2 bundles	18.00
Machine shop turn.	14.00
Cast iron borings	45.00
No. 1 cupola cast.	46.00 to 48.00

Los Angeles

No. 1 hvy. melting	$29.00
No. 2 hvy. melting	26.00
No. 1 dealer bundles	24.00
No. 2 bundles	17.00
Machine shop turn.	12.00
Shoveling turnings	13.00
Cast iron borings	13.00
Elec. furnace 1 ft. and under (foundry)	40.00
No. 1 cupola cast.	38.00

Seattle

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	31.00
No. 2 bundles	21.00
No. 1 cupola cast	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

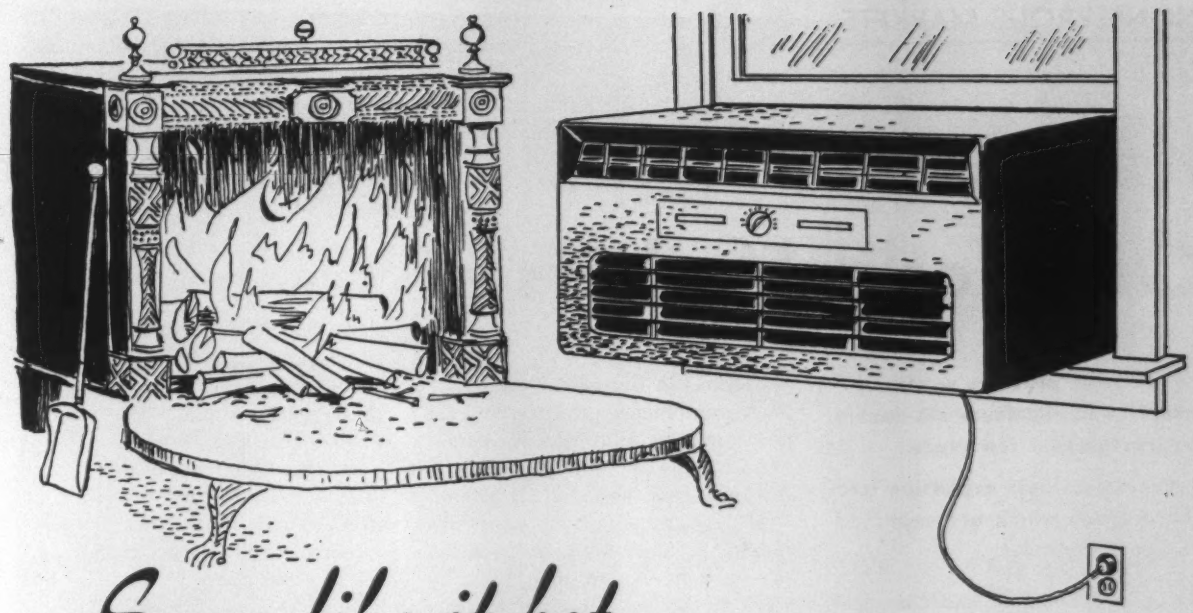
Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$25.80
No. 2 hvy. melting cut 3 ft. and under	22.50
No. 1 dealer bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Bush., new fact, prep'd.	25.50
Bush., new fact, unprep'd.	20.45
Machine shop turn.	10.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	33.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 2 bundles	20.50
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft. & under	$40.00 to 41.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00



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Kaiser Sets Sights On World Markets

Company predicts world consumption of aluminum will double during the next ten years.

Executive hints expansion into those areas which are expected to grow the most.

■ Kaiser Aluminum and Chemical Sales Co., the last of the major producers to get into international markets, is now among the biggest boosters of the possibilities.

D. A. Rhoades, president of Kaiser, predicts that by 1970 world consumption of primary aluminum will double. He estimates total free world consumption will reach 7,438,000 tons, and world consumption will total 10,188,000 tons.

That would boost world per capita consumption to 6 lbs from the current 3.2 lbs.

Ready to Go—"Development of sales and facilities abroad is a major objective of the corporation, as we now have the technical skill, organizational talent and vitality within our company to provide new leadership in the world of aluminum", says Mr. Rhoades.

Where will Kaiser place the emphasis on its world-wide development program? Mr. Rhoades isn't saying. But his forecast of consumption growth by areas might provide some clues.

North America will still be far and away the biggest market over the next decade. He figures current consumption of 2,210,000 million tons will hit 3,275,000 million tons by 1965, and 4,365,000 million tons by 1970. This would boost per capita consumption from about 22.4 lb currently to 36 lb by 1970.

Markets in Europe—Perhaps the most phenomenal growth will take place in the European Common Market, says Mr. Rhoades. But the rest of Europe won't be far behind.

He expects per capita consumption in the Inner Six to go from the present 2 lb to more than 14 lb by 1970. In the rest of Europe he looks for a per capita growth to 10.1 lb in the decade from the current 2.8 lb.

This would make total consumption in 1970 about 1,257,000 tons in the Common Market, and 854,000 tons in the rest of Europe.

In the Soviet bloc, Mr. Rhoades believes current consumption is about 1,040,000 tons. He expects this to hit 1,780,000 tons by 1965, and 2,750,000 tons by 1970. This would be a rise in per capita use from 0.6 lb currently to 4.4 lb in 10 years.

Aluminum

Despite the current glum posture of the major U. S. aluminum producers, 1961 is starting to look better and better.

It now appears producers will boost sales and shipments, and this will relieve at least part of the pressure now squeezing profit margins. Producers now say the sales edge was taken off 1960 by extensive hedging last year when there was a possibility of a strike.

Adjust the Hedge—One suggests that a more accurate picture of the real condition of the market in the last few years would be simply to add sales of 1960 to 1959, then divide by two.

This would adjust for hedging. And this would also indicate that the overall growth of the industry was actually maintained pretty well despite sagging sales this year.

Projecting this trend into 1961, some industry sources are starting to talk about 5 to 15 pct better business.

Less Pressure—The pressure will come off the profit margins because at least several of the producers are going into 1961 with large stocks of unsold metal. The cost of producing this metal is showing up in 1960 figures. Profits will show up when it's sold in 1961.

Industry generally agrees that total production in 1960 well may set a new record. And even the most conservative voices say that if output in 1960 doesn't top the record high of 1.95 million tons made in 1959, it will come very close.

Yet sales of two of the three major producers are off sharply from last year. And another combination of two report much lower earnings. But, the industry points to the tremendous strides made in market development in 1960, particularly in packaging and automotive markets. This should lead to greater sales to these markets next year.

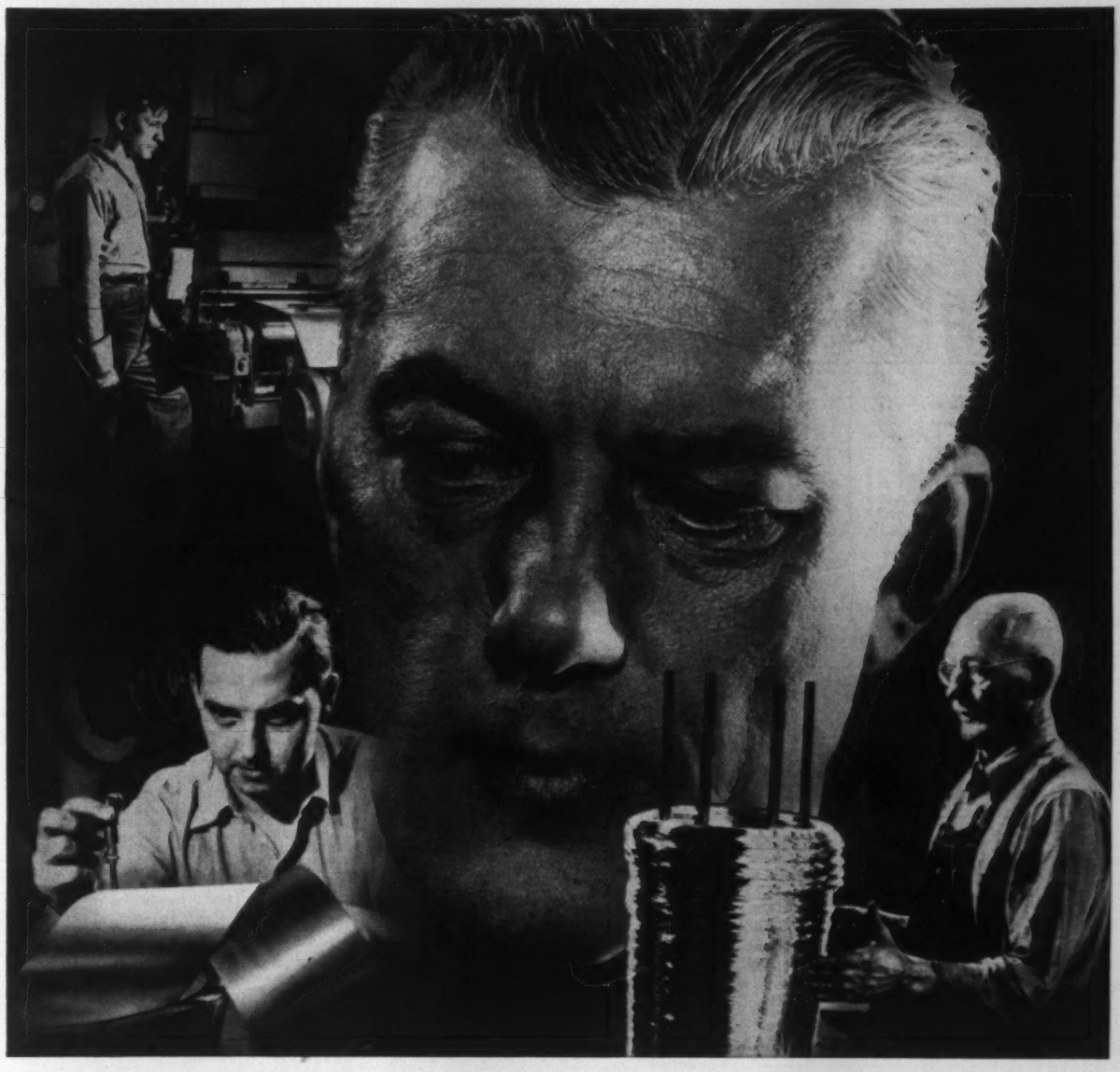
Tin prices for the week: Nov. 9—104.00; Nov. 10—103.875; Nov. 11 — HOLIDAY; Nov. 14—103.625; Nov. 15—103.500*.

*Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum ingot	26.00	24.70	12/17/59
Copper (E)	30.00	33.00	10/11/60
Copper (CS)	30.00	31.00	10/13/60
Copper (L)	30.00	33.00	10/13/60
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/8/58
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% Ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; **Other primary prices, pg. 204.**



Employees at Bristol Brass are Your Greatest Asset

Fine craftsmanship can be trained only one way . . . by setting the highest possible standards of performance — *and making them stick.* Here at Bristol Brass no one is ever asked to produce "commercial grade". He *wouldn't know how.*

Time after time, job after job, every Bristol customer receives the same uniformly high, intelligently interpreted reproduction of product by loyal veteran mill men and deft newcomers. This is "Bristol Fashion" . . producing Brass sheet, rod, wire second to none. The BRISTOL BRASS Corporation. Since 1850, makers of Brass strip, rod and wire in Bristol, Connecticut. Bristol Brass has offices or warehouses in Boston, Buffalo, Chicago, Cleveland, Dayton, Detroit, Milwaukee, New York, Philadelphia, Pittsburgh, Rochester, Syracuse *and for brass forgings, too* . . . Accurate Brass Corp. (subsidiary of The Bristol Brass Corp.), Bristol, Connecticut.

"BRISTOL FASHION" MEANS BRASS AT ITS BEST

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/4
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	55.13	.....	52.36	56.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	51.75	52.04	51.69	55.81
Brass, Red	52.62	52.91	52.56	56.68
Brass, Naval	54.08	60.39	47.89	58.24
Muntz Metal	52.14	.....	47.45	.....
Comm. Bz.	54.03	54.32	53.97	57.84
Mang. Bz.	57.82	.....	51.42	.....
Phos. Bz. 5%	75.70	75.70	76.20	77.63

Free Cutting Brass Rod 34.88

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base.... $ 1.31
Cobalt, 97-99% (per lb)..... $1.50 to $1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9%, dollars per troy oz.. $2.25
Iridium, dollars per troy oz..... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz.. $24 to $26
Platinum, dollars per troy oz.. $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per kg. $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 28.25
- No. 120 ..... 27.25
- No. 123 ..... 26.25

80-10-10 ingot
- No. 305 ..... 32.75
- No. 315 ..... 30.50

88-10-2 ingot
- No. 210 ..... 40.50
- No. 215 ..... 37.25
- No. 245 ..... 32.50

Yellow ingot
- No. 405 ..... 23.50

Manganese bronze
- No. 421 ..... 27.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.25-24.50
- 0.60 copper max. 24.00-24.25

Piston alloys (No. 132 type).. 26.00-27.00
No. 12 alum. (No. 2 grade)... 22.75-23.25
108 alloy 23.25-23.75
195 alloy 25.75-26.75
13 alloy (0.60 copper max.)... 24.00-24.25
AXS-679 (1 pct zinc) 23.00-24.00

(Effective Nov. 15, 1960)

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 23.75-24.75
Grade 2—92-95% 22.50-23.50
Grade 3—90-92% 21.50-22.50
Grade 4—85-90% 21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	20⅜	18⅜
Red brass	23¼	22½
Comm. bronze	24	23¼
Mang. bronze	19½	18⅜
Free cutting rod ends.	19⅝	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24½
No. 2 copper wire	22½
Light copper	20¼
*Refining brass	20½
Copper bearing material	19

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24¼
No. 2 copper wire	23¼
Light copper	20¾
No. 1 composition	20¼
No. 1 comp. turnings	19¾
Hvy. yellow brass solids	15
Brass pipe	14
Radiators	16
Aluminum	
Mixed old cast.	13 —13½
Mixed new clips	14½—15
Mixed turnings, dry	13½—14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	21½—22
No. 2 copper wire	19½—20
Light copper	17½—18
Auto radiators (unsweated)	12½—12¾
No. 1 composition	16½—17
No. 1 composition turnings	15¼—15¾
Cocks and faucets	12¾—13¼
Clean heavy yellow brass	11¾—12¼
Brass pipe	13¼—13¾
New soft brass clippings	13½—13¾
No. 1 brass rod turnings	12½—12¾

Aluminum

Alum. pistons and struts	6½— 7
Aluminum crankcase	8½— 9
1100 (2s) aluminum clippings	10 —10½
Old sheet and utensils	8½— 9
Borings and turnings	4½— 5
Industrial castings	9 — 9½
2020 (24s) clippings	10 —10½

Zinc

New zinc clippings	7 — 7¼
Old zinc	4 — 4½
Zinc routings	3 — 3¼
Old die cast scrap	2 — 2¼

Nickel and Monel

Pure nickel clippings	52-54
Clean nickel turnings	40
Nickel anodes	52-54
Nickel rod ends	52-54
New Monel clippings	23-23.50
Clean Monel turnings	16.50-17
Old sheet Monel	22-23
Nickel silver clippings, mixed.	18
Nickel silver turnings, mixed.	15

Lead

Soft scrap lead	8 — 8¼
Battery plates (dry)	3 — 3¼
Batteries, acid free	2 — 2¼

Miscellaneous

Block tin	79 —80
No. 1 pewter	59 —60
Auto babbitt	43 —44
Mixed common babbitt	10¼—10¾
Solder joints	14½—15
Siphon tops	41
Small foundry type	9¾—10¼
Monotype	9¾—10¼
Lino. and stereotype	8¾— 9
Electrotype	7½— 7¾
Hand picked type shells	5¼— 5¾
Lino. and stereo. dross	2¼— 2¾
Electro dross	2¼— 2¾

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,13*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh Midland Butler Aliquippa N. Castle McKeesport Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3, B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follanabee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective Nov. 15, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Thin Tinplate (electro)
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		Prices are for 0.50 lb. base box for 0.45 lb. deduct 15¢; for 0.55 lb. add 15¢; for 0.60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	$6.35 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*	Holloware Enameling 29 ga.—7.85 *U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; 7.95 *G2* at Granite City.		
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	$6.25 *U1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	$6.35 *T2*
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets.

(Effective Nov. 15, 1960)

†† 7.425 at Sharon; Niles is 7.225.

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *S3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*		7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Nov. 15, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore**	$.10	7.87	9.71	10.16	10.78	8.44	9.13	8.65	11.90	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	16.76	.....	.....
Boston**	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.80	9.95	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.72	10.35	10.30	10.89	8.56	9.06	8.70	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	8.89	10.41	10.35	11.21	8.94	9.62	9.02	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.72[1]	10.03	11.39	11.01	8.80	9.45	8.81	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	.....	.....	.....	20.84
Detroit**	.15	8.98	10.61	10.65	11.26	8.93	9.62	9.01	11.16	17.38	16.38	21.48	20.73
Houston**		9.22	9.65	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**		9.59[1]	11.29	12.20	11.29	9.70	10.45	9.55	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.13	10.20	.....	11.39	8.81	9.16	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	8.86	10.49	10.44	11.03	8.70	9.28	8.84	11.04	17.24	16.24	21.24	20.59
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia**	.10	8.45	9.70	11.50	10.95	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	8.72	10.03	11.28	10.99	8.56	9.06	8.70	11.40	17.10	16.10	21.20	20.45
Portland**		9.45	11.30	12.35	11.45	9.60	10.80	9.45	16.65	18.60	17.80	22.70	22.20
San Francisco**	.10	10.27	11.79[2]	11.50	11.88	10.48	10.50	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.92	10.75	10.68	11.09	8.77	9.29	8.92	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.99	9.84	10.99	11.16	8.83	9.33	8.97	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—¼" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅛" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Nov. 15, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	Pct
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	Pct
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46
Machine Screws—bulk		
¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	29.50	33.25	29.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	32.75 39.50	42.50	34.50 39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown. *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* wensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 *lb*
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Nov. 15, 1960)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Annl'd ¢/lb.	Merch. Wire Galv. ¢/lb.
	Col	Col	Col	Col	Col		
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.95	10.50
Rankin Pa. *A5*	173	187	.....	.....	193	9.00	9.55
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50
SparrowsPt. *B3***	175	.....	.....	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Youngstown *R3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Fontana *K1*	+10.75	+26.00	+7.75	+22.00	+4.25	+17.50	+1.75	+16.75	+1.25	+15.75	+0.75	+15.25	0.75	+15.50								
Pittsburgh *J3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Alton, Ill. *L1*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Sharon *M3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Fairless *N2*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Pittsburgh *N1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Wheeling *W5*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Wheatland *W4*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Youngstown *Y1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Indiana Harbor *Y1*	1.25	+14.0	4.25	+10.0	7.75	+5.50	10.25	+4.75	10.75	+3.75	11.25	+3.25	12.75	+3.50								
Lorain *N2*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Youngstown *R3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Fontana *K1*	+6.25		+2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Alton, Ill. *L1*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Sharon *M3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Wheeling *W5*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Indiana Harbor *Y1*	5.75	+8.0	9.75	+4.0	12.75	0.50	13.25	+0.75	13.75	0.25	14.25	0.75	14.75	+0.50								
Lorain *N2*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

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FULLY STAFFED & EQUIPPED

FOR SALE — FAVORABLE TERMS

Successful, currently operating 30,000 sq ft light & medium stamping plant, 2 story building, unlimited floor load; metropolitan New York area.

EQUIPMENT includes many various sized, late model power presses, modern toolroom, assorted barrel plating, still tank plating, Hansen automatic copper-nickel-chrome plating machine with rectifiers, etc.

STAFF includes tool & diemakers, supervisory, office, packing & shipping and 100 production personnel under favorable labor contract.

Reasonable lease with 10 year renewal option available. Product line & dies not included. Full price $300,000, $100,000 down. Balance $1500 weekly.

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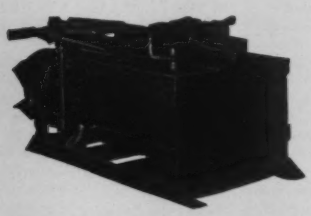
KARDONG CIRCLE BENDER

For Concrete Reinforcing Bars

This is a powerful and fast machine for heavy duty work in both fabricating plants or in the field where large tonnage is required. It will handle as high as 20 tons a day. Circles of any size required in concrete reinforcing work from 18 inches in diameter up can be bent on this machine. It will bend bars with two or more radii on the same bar without stopping the machine.



Made in two sizes,
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"NONE BETTER"

FOR PERFECT SOLDERING IN LESS TIME

Use Rubyfluid soldering flux. Fast acting . . . easy to use . . . wets out freely . . . insures strong unions. Ask your jobber or write for special $1.00 offer.

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MULTIPLE SPINDLE

CHUCKING MACHINES

Tool Rotating

GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I3*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	15.60	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Castle, Pa. *M10*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper
- Rolled elliptical, 18 in. or longer, 5000 lb lots 48.00
- Electrodeposited, 5000 lb lots ... 39.50

Brass, 80-20, ball anodes, 2000 lb or more 53.00

Zinc, ball anodes, 2000 lb lots 20.50
(for elliptical add 1¢ per lb)

Nickel, 99 pct plus, rolled carbon, 5000 lb 1.0225
(Rolled depolarized add 3¢ per lb)

Cadmium, 5000 lb 1.40

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum..... 65.90

Copper sulphate, 25.2 Cu min, 6000 to 12,000 lbs per cwt $13.75

Nickel sulfate, 5000 to 23,000 lbs... 29.00

Nickel chloride, freight allowed, 100 lb 45.00

Sodium cyanide, domestic, f.o.b. Chicago, 200 lb drums 25.00

Zinc cyanide, 100 lb 60.75

Potassium cyanide, 100 lb drum N. Y. 45.50

Chromic acid, flake type, 10,000 lb or more 30.44

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Iron Powders

- Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R. 11.50
- Electrolytic Iron, melting stock, 99.87 pct Fe, truckload lots 25.75
- Carbonyl Iron (200 lb lots) 88.00
- Welding Grades 8.10
- Cutting and Scarfing Grades 9.85
- Hydrogen reduced, domestic 11.25

Copper Powders

Molding Grades
- Electrolytic, domestic, f.o.b. shipping point. 15.00†
- Atomized ..... 43.3 to 61.3
- Reduced ..... 15.00†
- Chemically Precipitated 44.5

Brass, 5000-lb lots ..... 35.2 to 50.1

Bronze, 5000-lb lots ..... 51.3 to 55.2

Chromium, electrolytic 5.00

Lead ..... 7.50†

Manganese, electrolytic ... $1.00

Molybdenum .....$3.60 to $4.35

Nickel $1.15

Carbonyl Nickel, 20,000 lb lots $1.01

Nickel-Silver, 5000 lb lots.. 58.8 to 66.9

Silicon 70.00

Solder ..... 7.00†

Stainless Steel, 316 ..... $1.07

Stainless steel 304 ..... 89.00

Tin ..... 14.00†

Titanium, 99.25 + pct, per lb, f.o.b. $11.25

Tungsten, carbide grades... $3.25

Zinc ..... 21.0 to 34.2

† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30		
		Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, P2, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 43.40; 1 side, 36.35.

(Effective Nov. 15, 1960)

REFRACTORIES

Fire Clay Brick

	Carloads per 1000
Super duty, Mo., Pa., Md., Ky....	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk...	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. $158.00	
Childs, Hays	163.00
Chicago District	168.00
Western Utah	183.00
California	185.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O. 163.00-168.00	
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union, Pa.	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Standard chemically bonded, Baltimore, Md. $620.00	
Gary, Ind.	658.50
Standard, Pascagoula, Miss.	647.50
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Baltimore	585.00

Magnesite Brick

Standard, Baltimore $715.00	
Chemically bonded, Baltimore	655.00
Chemically bonded, Pascagoula, Miss.	682.50

Grain Magnesite

St. ⅜ to ½-in. grains

	Per net ton
Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b., Pascagoula, Miss...	80.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
¼ in sacks 52.00-54.00	

Dead Burned Dolomite

F.o.b. bulk, producing points in: Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100,110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox..	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube.....	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel...	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

GUARANTEED—RE-NU-BILT

Electric Power Equipment — A. C. Motors

3 phase—60 cycle

SLIP RING

Qu.	H.P.	Make	Type	Volts	Speed
1	1750	G.E.	M-578B8	4800	1800
1	800	Whse	CW	500	1775
1	800	G.E.	MT-428	2300	450
1	600	Whse.	CW	220/440	900
1	600	Whse.	CW-4-83D-15	440	1775
1	550	Whse.	CW	440	253
1	500	Whse.	CW	550	350
1	300	A.C.	ANY	440/2300	720
1	300	G.E.	MTF561	2300	1800
1	250	G.E.	IM-16	220/440	875
1	250	A.C.	ANY	550	900
1	250	Cr. Wh.	Rine 20Q	2300	850
1	250	G.E.	MT-434Y	4000	257
1	200	G.E.	IE-15B	220	1800
3	200	Whse.	CW-200	2300	1775
1	200	G.E.	IM	440	435
1	150	G.E.	IM-17	440	435
1	200	G.E.	IM	2200	550
1	125	G.E.	MT-557	220/440	1200
8	100	A.C.		440	695
1	100	G.E.	M-6385Z	220/440	550

SQUIRREL CAGE

1	500	G.E.	FT-550AY	2300	3600
2	500	Whse.	CSP-582H	440	3600
1	500	Whse.	CS-1115	2300	863/445
4	500	Whse.	CS-1316	2300	500
2	450	Ell.	F-3910	2300	1200
1	400	Whse.	CS-7151 610H	6800/4000	3585
1	300	Whse.	CS-1003	2300/440	600
1	250	Whse.	CS-875S	2200	1775
1	200	Whse.	CSP-581S	440	3450
2	200	Whse.	CS-855S D.P.	220/440	1750
300/150		Whse.	CS-963H	2300	1175/875
1	150	G.E.	FT-584	2300	875
1	150	Whse.	CS	440	580
1	125	Whse.	CS-784C	220/440	1160
8	100	Whse.	CS-760C	2300/440	1160
1	100	Whse.	B.B.CS-607-220/440		1750

SYNCHRONOUS

1	8000	G.E.	AT1.8	200/6600	600
1	3500	G.E.	TS 1.0	4600/2300/4000	350
2	1750	G.E.	ATI	2300	3600
3	500	G.E.	TS-9560.8P.F.	2300	1200
1	400	G.E.	TS-7565	2300	1200
2	350	G.E.	ATI 1.0P.F.	2300	150
1	325	G.E.	ATI 1.0P.F.	440	1800
3	300	Ill Mach.	BRKT	2300	1200

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MODERN DESIGN
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atmosphere-controlled with 9 bases, are available. Each is approximately 7' x 7' x 14'. Excellent when used for manufacture of steel coils, they have a capacity of 50 tons per charge. These top-grade furnaces are still set up in the plant. Tremendous values specially priced for prompt sale.

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CAnal 6-2470

Louisville Partners Take to the Air

Used machine dealers in many parts of the country are finding the going tough these days.

But, in Louisville, two partners have taken to the air to cover many business ventures.

■ There are probably few used machine dealers who cover as many miles as quickly as Sam Rosenberg and Harry Kletter of Louisville.

These partners fly their own 2-engine Piper within a radius of 1000 mi. of Louisville and credit the plane with a major contribution to the steady expansion of their business. At one time last year, for example, the plane enabled them to simultaneously supervise four active jobs plus several bids.

"We were dismantling plants and removing machinery from both Hannibal, Mo. and Virginia, Ill.," says Mr. Rosenberg. "At the same time we were cutting and removing scrap from Rockford, Ill. and Port Clinton, O. And we were also inspecting and bidding on machinery and equipment at several Midwest military installations. With the airplane, it was not too hard to cover and control the job at all times.

Progressive Growth — "We feel that flying is giving us the opportunity to grow progressively with a broader scope and greater coverage in both buying and selling than is normal in our business. We feel that it also enables us to think of diversification at a time when this may be the only means of making any progress in the business today."

The partners, who also operate Tri-City Snap Baling Co., backed into aviation the hard way. In their first year together — 1952 — they bought a surplus airplane for scrap purposes and re-sold the engine to a local airport operator.

However, the money was not available so the partners agreed to take it out in flying lessons. This was the start of their flying program. They are now on their third airplane covering an area far out of the normal scope of operations.

The Beginning—The partnership had its beginning at a Junior Chamber of Commerce meeting in Sarnia, Ont. Mr. Rosenberg was Michigan state president from Coldwater, Mich., and Mr. Kletter was a state director from Detroit. The two teamed up that year to start a scrap yard at New Albany, Ind., across the Ohio river from Louisville.

The following year, they took over a small tract in Louisville and started dealing in surplus machinery and plant dismantling which began to yield saleable machinery.

In 1956 they moved into their present 15-acre headquarters in South Louisville. In addition to scrap operations, they have also branched out into commercial waste hauling using large containers.

"We are at present increasing our used equipment and machinery operation as fast as possible. By next spring we hope to have a complete warehousing operation for them," says Mr. Rosenberg.

The multi-operation system of Mr. Rosenberg and Mr. Kletter points to the fact that many used machine dealers, like scrapmen, may be moving toward greater diversification.

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Straightening Rolls 1" x 86"
Upsetting & Forging Machines, air clutch, 1", 1½", 2", 4"
3000# Chambersburg Ceco Drop Hammer
#5-C Ajax Forging Press
#59 Toledo S.S.S.C. Press 345-tons, Stroke 10"

Donahue Steel Products Company
1919 W. 74th St., Chicago 36, Ill.

REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

SLIP RING MOTORS
3 Phase—60 Cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1**	2500	Al.Ch.	ANY	2200	200
1**	1800	Whse.	Mill	2300	253
1**	1300	Whse.	CW	2220	444
1	700	Whse.	CW-1224	2200	600
1**	500	Al.Ch.	ANY	2200	505
1**	500	Al.Ch.	ANY	2200	293
1	400	Whse.	CW	2200	600
1*	400	Al.Ch.	ANY	2200	505
1	400	Whse.	CW	2200	290
1	350	G.E.	IE15-M	2200	1180
3	300	G.E.	IE15B-M	440	1200
1	300	Whse.	CW-1013	2300/440	720
1	250	Whse.	CW	4160/2400	710
1	250	Whse.	CW	2200	600
1	250	Cr. Wh.	Size Q	4600/2300	350
1	250	G.E.	MT-414	2200	300
2	200	G.E.	I-17-M	2200/440	600
1	200	G.E.	I-14-M	2200	400
1	150	G.E.	MT-564	2300/440	700
1	150	Whse.	CW	4160/2200	585
1	150	Whse.	CW-954	440	514
1	150	Whse.	CW-1000	440	435

*—Pedestal Bearings
**—Mill type with stator shifting base

SYNCHRONOUS MOTORS
3 Phase—60 Cycle

Qu.	H.P.	Make	P.F.	Volts	R.P.M.
1	4200	G.E.	.90	13200/6600/4160	300
1	4500	Whse.	.80	4700	1200
2	1750	G.E.	1.00	2300	3600
2	1750	Whse.	1.00	4160	450
1	1500	Whse.	.80	2300	514
2	1450	Whse.	.80	4160	450
1	920	G.E.	1.00	440	300
1	700	El.Mohy.	1.00	440	220
1	650	G.E.	.80	2300/4000	1200
1	500	El.Mohy.	.80	2300/4000	720

FREQUENCY CONVERTING SETS

1—3000-KVA G.E. 300 R.P.M., 2300-Volt, 3 phase, 25 cycle with Syn. Motor, 3600-HP, .90 P.F., 13200/6600/4160-Volt, 3 phase, 60 cycle, with exciter and complete starting equipment.
1—460-KVA G.E. 300 R.P.M., 440-Volt, 3 phase, 25 cycle and Syn. Motor 500-KVA, .80 P.F. 440-Volt, 3 phase, 60 cycle, exciter and Starting Equipment.

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UNIVERSAL Machinery & Equipment Co.

AMERICA'S LARGEST STOCK OF FOUNDRY EQUIPMENT

• ARC MELTING FURNACES
250# LECTROMELT—185 KVA
500# LECTROMELT—200 KVA
1000# SWINDELL—500 KVA
2000# SWINDELL—1000 KVA
3000# HEROULT, Door Charge
DETROIT FURNACES—10 lb. to 3000 lb. Cap.

• INDUCTION HEATING FURNACES
75 KW TOCCO M.G. Induction Heater 2 station
20 KW THERMONIC Induction Heater 2 station
20 KW ECCO Induction Heater
15 KW GIRDLER Dielectric Heater

• INDUCTION MELTING FURNACES
20 KW AJAX Spark Gap 17# Melting
30 KW VACUUM Melting, Complete—Like New
100 KW AJAX Melting Installation—Late
200 KW, 960 cycle, 1000# steel

• HEAT TREAT FURNACES
36"x72" Gas Fired Box, 1950°F.
4'x4'x10' Gas Fired Box
7' G. E. Rotary Hearth Electric, 1900°F.
36" dia. x 36" deep Electric Recirculating
42" wide roller Hearth 50'L w/atmos. gen.
24"x16'Lx36" 210 KW conveyor. 1400°F.
10"x12"x24" LINDBERG 2500°F. hydrogen

• CLEANING EQUIPMENT AND GRINDERS
15x20 WHEELABRATOR
20x27 WHEELABRATOR
27x36 WHEELABRATOR w/loader
36x42 WHEELABRATOR w/loader
42x42 WHEELABRATOR w/loader
48x72 WHEELABRATOR w/loader
dust Collectors available for all machines
WHEELABRATOR No. 1-A Multi Table
72" WHEELABRATOR Swing Table
96" WHEELABRATOR Swing Table
9' LK PANGBORN Table-room
WHEELABRATOR Pipe Cleaning Cabinet to 12" O.D.
SAFETY 10 H. Swing Grinder
WHITING 26"x54" tumbling barrel

96" WHEELABRATOR SWING TABLE
Capable of handling work 96" in diameter & 42" high.

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1500 HP Alco Diesel Electric Switcher Locomotives. New 1949. Excellent Condition. 7 Available.
44 Ton Gen. Elec. Diesel Elec. Loco. Cummins 190 HP Engine. 4 Traction Motors. Rebuilt.
25 Ton Gen. Elec. Diesel Elec. Loco. New 1942. Cummins Engine.
40 Ton Ind. Brownhoist Diesel Loco. Crane. New 1946. Caterpillar Eng.
25 Ton Ind. Brownhoist #5 Diesel Loco. Crane. New 1941. Cat. Eng. Recond.
60 Ton Link-Belt K-595 Lifting Crane. 120' Boom. Cat D-17000 Diesel.

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E. W. Bliss-Toledo Machine Tool Dliv. Horn or "Overhanging" Press, late
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No. 6F E. W. Bliss Three Crank Cupping Press
No. 164½ Toledo Toggle Drawing & Deep Stamping
7½ ton French Oil Mill Machine Co. Straightening, m.d., 1942
100 ton Wood Model 8229 Vertical Hydraulic, 4 col. Single action-down
600 ton Niles Horizontal Wheel Press
Type S750 Hennifin Hydraulic Straightening, m.d.
No. 3AA Canco (American Can Co.) Open Back Inclinable Punch Press, m.d.
No. 18C Bliss Open Back Inclinable Flywheel Type, belted drive
No. 24A Bliss Consolidated Horn Press, m.d.
2500 ton HPM Hydraulic Fast Traverse Press, 1941, standard for either rubber or aircraft

PROFILERS
Model BL 2416 Pratt & Whitney Keller Type, m.d.
No. 12B Pratt & Whitney Model 1693, 2 spindle, 1944
No. 12M Morey, 2 spindle, m.d., 1943
4 spindle 360° Cincinnati Automatic, m.d., 1944
30" capacity 2 spindle Pratt & Whitney Vertical Miller & Profiler, Model 1482

PUNCHES & SHEARS
No. 5 Hilles & Jones Pnch & Shear, single end, Type "G"
No. 7 Thomas Vertical, latest

RAILROAD MACHINERY
No. 2 Niles-Bement-Pond Axle Lathe, m.d.
No. 3 Niles Axle Lathe, m.d.
52" Betts Hydraulic feed Car Wheel Borer, & Facer, m.d.
52" Niles-Bement-Pond Car Wheel Lathe, m.d.
90" Niles Journal Turning Locomotive Lathe, including 2 inside journal turrets and 3½" spindle double quartering attach., m.d.
90" Niles Driving Wheel Lathe, m.d., latest
90" Niles Balanced Quartering & Crank Pin Turning Machine, m.d.
Chambersburg Mounting & Dismounting H.S. Duplex Car Wheel Press

SAWS
Model V-60 DoAll Contour Sawing, Filing & Polishing Machine
No. 4B Robertson Economy, m.d., new
No. 4XB Robertson Economy, m.d., new
No. 32B Cochran Bly Cold Saw, m.d., latest
Model 102, Type JCAW, Cincinnati Elec. Tool & Abrasive Cut-off, m.d.
Model 401 Cutomatic Abrasive Cut-off, m.d.
6 x 6" Peerless High Duty Hydraulic Standard, m.d.
Type 36W DoAll H.S. Band Machine, vari speed, m.d.
Type SM Laidlaw 20" Metal Cutting Band Saw, m.d.

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EXCEPTIONAL BARGAIN—PRICED AT LESS THAN 20% OF REPLACEMENT COST

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No better values at any price

100 CFM 100 psi 6 x 7 Ing. or Worth.
138 CFM 100 psi 7 x 7 Ing.—CPT—Worth.
142 CFM 125 psi Ingersoll Rand Type 40-Jaeger.
183 CFM 150 psi 7 x 7 Jay WG9.
191 CFM 300 psi 9-4¼ x 9 ES-2.
194 CFM 125 psi 7-7-8 x 5 Worth. M40.
234 CFM 100 psi 9 x 9 Ing.—Worth. Chic. Pneu.
290 CFM 75 psi 10 x 9 Ing. ES-1.
384 CFM 100 psi 10 x 9 Jay WG9.
465 CFM 100 psi 12 x 11 IR—Amer.
582 CFM 125 psi 12 x 13 Ing. Rand, Worth
585 CFM 100 psi 15-9¼ x 12 Ing.
900 CFM 125 psi 11½ x 7 x 7 Jay WN 102.
978 CFM 100 psi 15-9¼ x 12 Ing. XRB.
985 CFM 100 psi 14 x 13 IR—CPT.
977 CFM 125 psi 17/10½ x 14—IR—XRB.
1055 CFM 110 psi 18-11 x 12 CP. OOE.
175 hp G.E. Syn 3-60-200 volts, starter—MG set—Aftercooler Receiver.
1870 CFM 100 psi C300-300H Fuller Rotary.
300 hp West. Syn. 3-60-440, 80% PF.
Portable Gas-diesel 60"-600".

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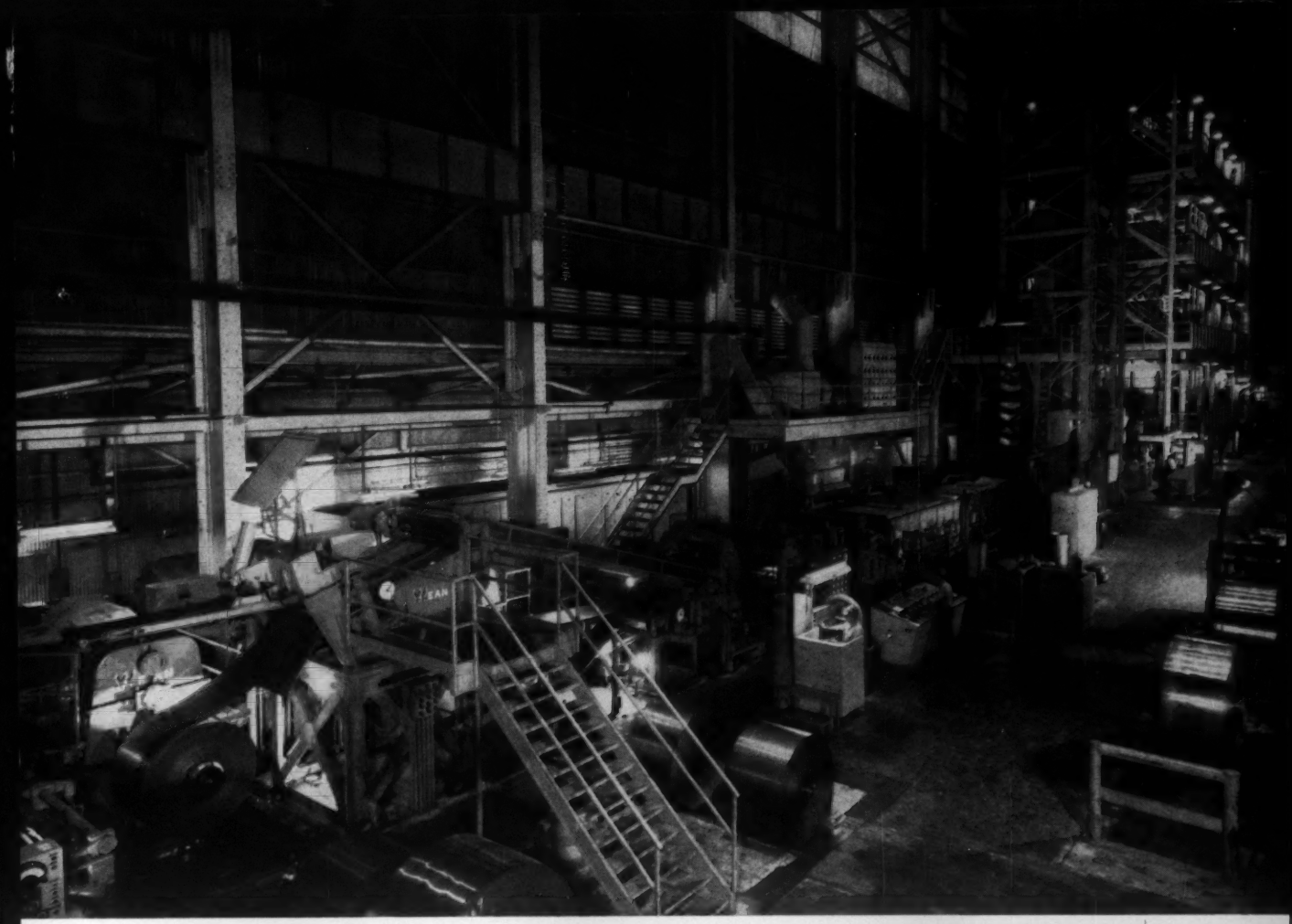

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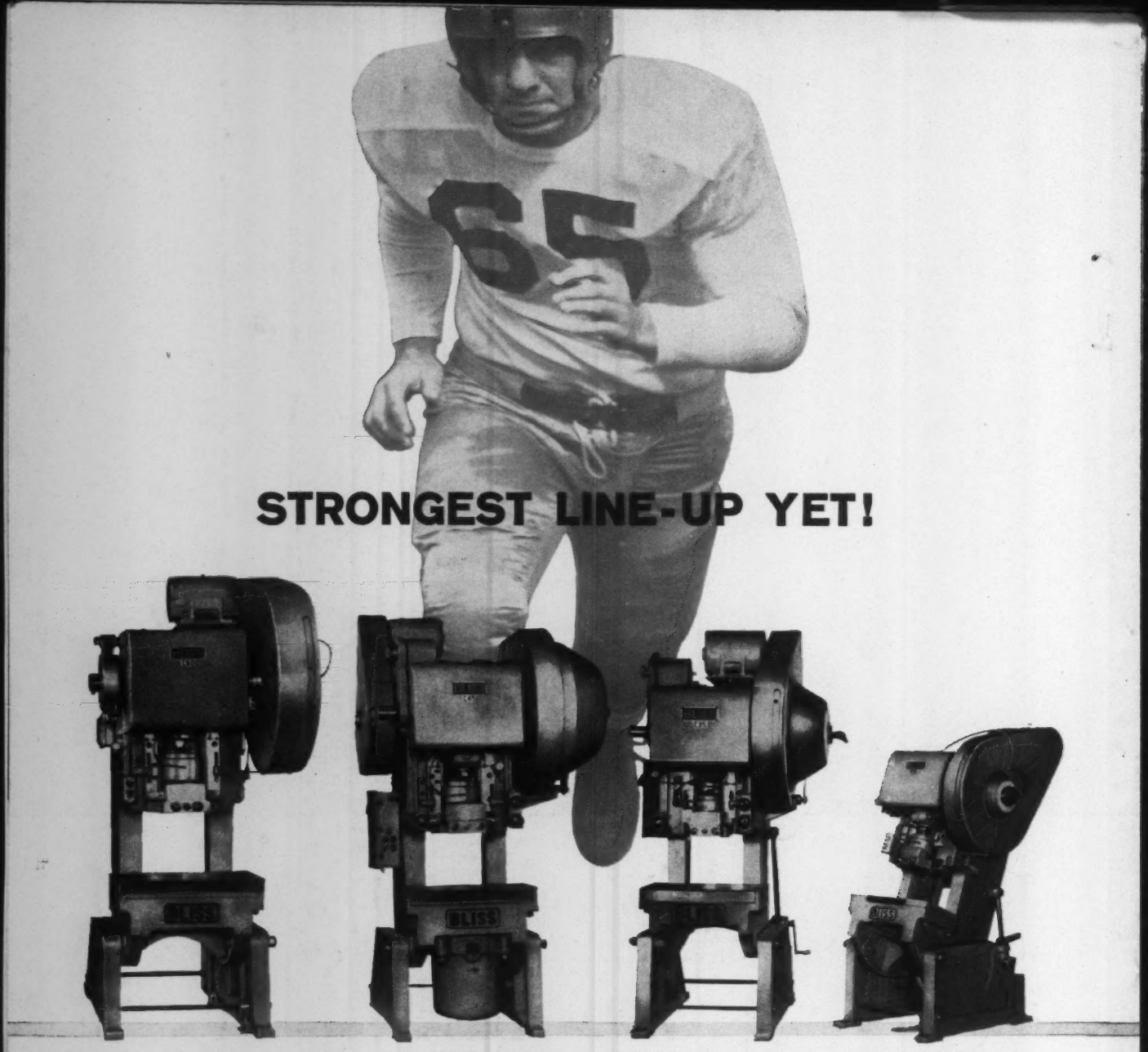

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